

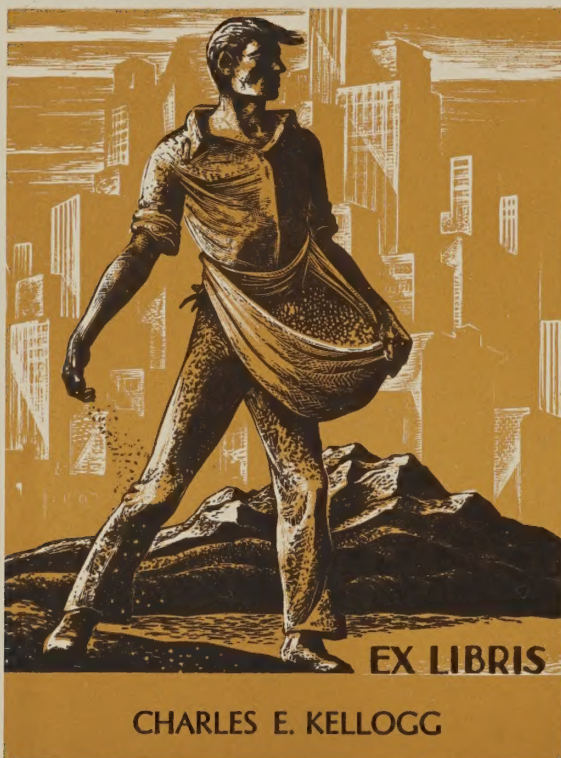


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IRAN

Report by V. Ignatieff

Duration of stay: 19th November to 29th November, 1958.

My stay in Iran can be subdivided into two phases: Policy discussions with FAO personnel, Iranian and KDS officials and the Director of the Soils Laboratory for a period of two days immediately after my arrival in Iran and again after the field trip to Khuzistan; and my field trip to Khuzistan (of six days duration) covering 2000 kilometers which was undertaken to view the fertilizer tests on cultivators' fields which are being carried out by FAO with KDS funds-in-trust.

For the sake of clarity in presentation, this report is given in three sections: Background Information, Policy Discussions and the Field Trip.

Under Policy Discussions, a summary is given of all discussions held in Teheran. Although some of the discussions were of a technical nature, nonetheless policy had a distinct bearing on them.

Background Information

The soils work in Iran is of particular interest because, at the present time, it is one of the most comprehensive programs in this field which is being undertaken by FAO in any country. Indonesia has a wide soils coverage and an extensive program will be put into operation in Viet-Nam next year, but up-to-date, in Iran FAO is advising on practically all aspects of soil science: i.e. soil survey and classification, soil management (including fertiliser tests and experimentation), soil laboratory work (including soil chemistry and physics). Soil microbiology has not yet been touched, but work will need to be done in this field when rotational experiments are started with legumes next summer. In Iran FAO has the largest Soils Team of any country of the world and much has been accomplished. These achievements have been obtained by the devoted service of past and present FAO soil specialists, by the careful negotiations conducted by Mr. Mustafa over a period of years, by the leadership of Mr. Bakker (the Soil/Water Team Leader) and by the pioneering of Dr. Dewan.

The close association between FAO and KDS, which was initiated and is being stimulated by Mr. de Vajda has given a great impetus to the soils work in Iran. KDS are providing all the funds for the soil survey in the Khuzistan Region (including the salaries of three FAO soil surveyors, an Iranian assistant and vehicles), they are also providing for the Soil Fertility Scheme (including the salaries of two FAO Soil Fertility Specialists and twenty-eight Iranian engineers, vehicles, etc.) together with the salaries of two FAO soil analysts.

The present FAO Soils Group in Iran is as follows:-

Soil Survey and Classification:

Dr. M.L. Dewan (ETAP)	India
Dr. J.S. Veenenbos (KDS Funds-in-Trust)	Netherlands
Mr. M.P. van Coosten (KDS Funds-in-Trust)	" "
Mr. V.S. Subramanian (KDS Funds-in-Trust)	India

SECRET SECRET

Period of study: 19th November to 22nd November, 1955.

By way in Iran can be subdivided into two elements: Policy discussions with the personnel, Iranian and US officials and the Director of the field laboratory for a period of two days immediately after my arrival in Iran and again after the field trip to Hamadan; and my field trip to Hamadan (of six days duration) covering 2000 kilometers which was undertaken to view the fertilizer tests on cultivated fields which are being carried out by the two with the field-in-charge.

For the sake of clarity in presentation, this report is given in three sections: Background Information, Policy Discussions and the Field Trip.

Under Policy Discussions, a summary description of all discussions held in Tehran. Although some of the discussions were of a technical nature, non-technical policy had a distinct bearing on them.

Background Information

The soils work in Iran is of particular interest because, at the present time, it is one of the most comprehensive programs in this field which is being undertaken by IAO in any country. Iran has a wide soils coverage and an extensive program will be put into operation in West-Iran next year, but up-to-date, in Iran IAO is advancing on grounds of all aspects of soil science: i.e. soil survey and classification, soil management (including fertilizer tests and experimentation), soil laboratory work (including soil chemistry and physics). Soil microbiology has not yet been touched, but work will need to be done in this field when rotational experiments are started with legumes and cereals. In Iran IAO has the largest Soils Team of any country of the world and much has been accomplished. These achievements have been obtained by the devoted service of past and present IAO soil specialists, by the careful organization extended to the IAO by the leadership of Mr. Bakhtiari (the Soils) and by the planning of Dr. Nassiri.

The close association between IAO and IRI, which was initiated and is being maintained by Mr. de Vries has given a great impetus to the soils work in Iran. IRI are providing all the funds for the soil survey in the Hamadan Region (including the salaries of three IAO soil surveyors, an Iranian assistant and vehicles), they are also providing for the soil fertility scheme (including the salaries of two IAO soil fertility specialists and twenty-eight Iranian agronomists, vehicles, etc.) together with the salaries of two IAO soil analysts.

The present IAO Soils Group in Iran is as follows:-

Dr. H.L. Nassiri (IRI) (1955-1956)
 Dr. J.S. Vachon (1955-1956)
 Mr. H.L. van Gorkum (1955-1956)
 Mr. V.A. Bakhtiari (1955-1956)

Soil Survey and Classification:

Soil Fertility:	Dr. E. Schulze	(KDS Funds-in-Trust)	<i>Germany</i>
	Mr. J. Vermeer	(KDS Funds-in-Trust)	<i>Holland</i>
Soil Analysis:	Mr. J.W. Dawis	(ETAP)	<i>UK</i>
	Mr. O. Makitie	(KDS Funds-in-Trust)	<i>Finland</i>
	Mr. J.N. Benjaminsen	(KDS Funds-in-Trust)	<i>Norway</i>

The handling of the large Funds-in-Trust adds greatly to the responsibilities of the FAO Mission in Iran and requires a great deal of careful attention. The chief problem confronting the Soils Group in Iran at the present time is the need for increasing the output of soil analyses. This was one of my main preoccupations and no doubt a solution will be found. This is largely an administrative problem and is more fully dealt with under the section on Policy Discussions.

Soil Survey and Classification

The original work in the field of soils undertaken by FAO in Iran was soil survey and classification - this was started in 1953. Although a number of FAO specialists have been engaged in this field, Dr. M.L. Dewan has remained in the country since January, 1953.

Detailed, semi-detailed and reconnaissance soil surveys and classification groupings have been made on more than 25 different projects (totalling over one million hectares). In addition, a generalised Soil Resources Survey has been undertaken for overall development planning of soil and water resources of Iran.

In the past two years, under the Funds-in-Trust agreement with KDS, Dr. J.S. Veenenbos, assisted by other FAO soil survey specialists (and at present by Messrs. V.S. Subramanian and M.P. Van Oosten) have completed approximately twenty soil surveys of the detailed, semi-detailed and reconnaissance type. These surveys have covered more than 237,000 hectares in the Disful area and a final report has just been prepared and submitted to KDS.

Soil Analysis

The Central Soil Laboratory at Teheran was built under the guidance of FAO since 1954. This laboratory has been largely equipped through funds made available by ICA and has been in operation for the past eighteen months under the direction of a FAO specialists (Dr. Gracie).

The staffing of the laboratory is at present as follows:-

Director: Mr. Shariffie (who has been on an FAO Fellowship to the USA).
5 qualified chemists;
2 technicians
2 attendants

Mr. J.W. Dawis (ETAP) - Senior FAO Adviser
Mr. O. Makitie (Funds-in-Trust) from KDS)
Mr. J.N. Benjaminsen (Funds-in-Trust from KDS).

Soil Survey and Classification
Mr. J. J. Vanaman (1953) (1954)
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Mr. J. J. Vanaman (1953) (1954)

The heading of the large front-left side group to the right of the main title in line and receives a great deal of useful information. The chief problem confronting the Soil Survey in line of the present time is the need for increasing the output of soil surveys. This was one of the main recommendations and no doubt a solution will be found. This is largely an administrative problem and is more fully dealt with in the section on Policy Recommendations.

Soil Survey and Classification

The original work in the field of soil survey was done by the U.S. Bureau of Plant Industry in 1909. This was started in 1909. Although a number of the specialists have been engaged in this field, Dr. H. L. Brown has remained in the country since January, 1937.

In the past two years, under the United Nations agreement with the U.S. Government, conducted by other U.S. soil survey specialists (and at present by Messrs. J. J. Vanaman and H. L. Brown) have included approximately twenty soil surveys of the national, semi-detailed and reconnaissance type. These surveys have covered more than 100,000 hectares in the United States and a final report has just been prepared and submitted to UNO.

In the past two years, under the United Nations agreement with the U.S. Government, conducted by other U.S. soil survey specialists (and at present by Messrs. J. J. Vanaman and H. L. Brown) have included approximately twenty soil surveys of the national, semi-detailed and reconnaissance type. These surveys have covered more than 100,000 hectares in the United States and a final report has just been prepared and submitted to UNO.

Soil Analysis

The Central Soil Laboratory at Fortney was built under the guidance of UNO since 1954. This laboratory has been largely equipped through funds made available by UNO and has been in operation for the past eighteen months under the direction of a UNO specialist (Dr. Brown).

The staffing of the laboratory is at present as follows:-

- Director: Dr. Brown (who has been on an UNO Fellowship to the USA).
- 2 qualified chemists
- 2 technicians
- 2 assistants

Mr. J. W. Danks (UNO) - Senior UNO Advisor
Mr. O. N. Nilsen (UNO) - from UNO
Mr. J. M. Benjaminsen (UNO) - from UNO

It is the responsibility of the Laboratory to analyse all the soil and water samples submitted by the official agencies. Specifically, the samples in which FAO is interested are those collected under the Soil Survey, Soil Fertility and Irrigation Programs (in which fields FAO is advising). For example, during 1959 it is anticipated that about 6000 soil samples will need to be analysed for the Soil Fertility Program alone. The calibre of the FAO soils chemists is high: Mr. Dewis has been in charge of one of the soil laboratories in the United Kingdom and Messrs. Makitie and Benjaminson have been in charge of soil analytical sections in the main laboratories and institutes in their own countries. The FAO staff will do everything possible to ensure the analyses of all the samples sent to the laboratory but up to the time of my departure the administrative arrangements in the laboratory have not been working entirely satisfactorily. This is largely due to the fact that Dr. E. Fylessouffie (the Director of the Irrigation Bonga) to whom the Laboratory is responsible, has not been too desirous in the past of giving Mr. Shariffie (the Director of the Laboratory) full administrative powers, including the purchase of materials outside Iran and decisions regarding the pay of the Iranian staff who are at present on very low salary scales.

Discussions between the FAO Mission and Mr. Fylessouffie's office have been in progress concerning these matters for many months. The action taken during my visit is summarised under Policy Discussions.

Soil Fertility Program

The Soil Fertility Program has been initiated with Funds-in-Trust from KDS. Two annual contracts, for the years ending December 1957 and 31 December, 1958, have been in operation. It is understood that a contract for a two-year period will be signed in the near future and will be one involving a larger amount of funds than anything yet undertaken by FAO and KDS. Dr. Schulze is in charge of this project and he is assisted by Mr. Vermeer. The general subdivision of their responsibilities is such that Dr. Schulze gives overall supervision and concentrates his attention on the organization and conducting of the simple tests on cultivators' fields and Mr. Vermeer is responsible for the more complex fertilizer experiments in a number of rented fields scattered throughout the Khuzistan region.

Some 550 fertilizer tests (including 4000 plots) have been laid out on cultivators' fields during the season 1957/1958 - 60 percent of these have been with wheat and barley, laid out chiefly on irrigated land. Other crops used are: sugar beets, cotton and a few experiments have been carried out on rice and sesame. During the 1958/1959 season some 1500 experiments will be laid out on wheat (80%) and barley. Most of the experiments will be on irrigated land. 500 experiments will include such crops as sugar beets, cotton, legumes, rice, flax, sesame and vegetables. These experiments will involve the laying out of some 19,000 plots - a very large undertaking.

Through Funds-in-Trust, FAO has engaged the services of 28 Iranian graduates or engineers from the Agricultural Colleges. Three of these engineers are assisting Mr. Vermeer in the more complex fertilizer experiments and three others

are helping the KDS soil specialist with large field demonstrations. Twenty-two engineers are conducting simple fertilizer tests on cultivators' fields. The location of the offices from which the FAO and KDS personnel operate in the Khuzistan Region, the Centres they serve, the crops used for the trials and other administrative data are summarized in the Appendix table attached.

Since this report has been written a new arrangement has been made by KDS. All the Iranian personnel will for administrative purposes come under KDS which will make all the payments direct. The Iranians will then be assigned to FAO according to the needs of the program.

The following persons were interviewed:-

- Mr. Power - TAB Representative.
- Dr. E. Fyllescoffie - Director of the Irrigation Bonga.
- Mr. Rafati - Chief of the Fertilizer Section of Plan Organization.
- Mr. M.J. Memandi - Deputy to Mr. Rafati.
- Mr. Greig - Technical Bureau of the Plan Organization.
- Mr. Tealdi - Deputy to Mr. Greig.
- Mr. G. Shariffi - Director of the Central Soil Laboratory.
- Mr. Malek Ghasseri - Chief of the Soil-Plant Relationship Section of the Ministry of Agriculture.
- Mr. Crosby - in charge of the KDS office in Iran.
- Mr. Leo Anderson - Chief of Agriculture, KDS.
- Mr. Morley Davis.

Mr. Mustafa was either present at, or represented by Mr. Bakker (the Soil and Water Team Leader) at all the meetings held with Iranian agencies. On some occasions they both attended the meetings. In addition, Dr. Dewan was usually present and when the meeting was of an administrative implication, Mr. Hohenlohe sometimes attended.

Two interviews were had with Dr. E. Fyllescoffie, of the Irrigation Bonga. At the first meeting Mr. Mustafa stressed the need to improve the administrative procedures in the Laboratory, such as ensuring the most efficient employment of the Iranian staff and the FAO advisers, in order to facilitate the analysis of the large number of soil samples which will be gathered in the forthcoming year particularly from the FAO-KDS Soil Fertility Program. It was agreed that Dr. Fyllescoffie would give a written guarantee to Mr. Mustafa to analyse some 6000 soil samples from the Fertility Program in a specified time. I expressed the hope that by the time I returned to Teheran (from my field trip) this letter would have been received by Mr. Mustafa. Dr. Fyllescoffie gave this assurance. Mr. Fyllescoffie was again visited after my return to Teheran, a draft letter was discussed at length and a further promise was given by him for its early despatch to Mr. Mustafa. However, this was not done and a similar promise was given to Mr. de Vajda when he was in Teheran a week later.

Since this report was written the pay of the Iranian staff of the laboratory has been increased, but by so small an amount, that it has caused great discontent.

Informal meetings were held with members of the Plan Organization, on a number of subjects one of which was the possibility of all the soils work in Iran (including soil survey, soil fertility and soil laboratory work) being placed temporarily under the Plan Organization as a separate Institute or Organization until such time as the work in the field of soils was sufficiently developed. At a later date the newly-formed Soils Institute, or Department, could be moved to the Ministry of Agriculture. Such an arrangement would be justified because the scope of the soils work is much broader than merely

KDS has decided to set up its own field laboratory in old Ahwaz (Khuzistan region) with the help of the FAO-KDS soil analysts.

providing information for irrigation development. These ideas appeared to me to be very close to certain thinking within the Plan Organization. In fact it was with this thought in mind that Plan Organization requested FAO to take over the recruitment of Mr. Morley Davis, from the United Kingdom. Plan Organization had offered Mr. Morley Davis a salary of \$18,000 a year and then realized that it was necessary to obtain a Parliamentary permit to engage a foreigner for employment in the government service. FAO agreed to recruit Mr. Morley Davis, on our own terms, at \$12,000 annual maximum salary but he decided not to accept FAO's terms and Plan Organization will therefore proceed with his recruitment as soon as Parliamentary permission is granted. Plan Organization is hoping that Mr. Morley Davis will coordinate all the work in soil fertility and in soil research and training.

The past work was briefly reviewed with Mr. Anderson of KDS and during these discussions the need for maintaining all experimental records was stressed and also the need for statistical treatment of the experimental results. This view is also held by KDS. An assurance was given by KDS that the contract will be renewed. Mention was made of the possibility of establishing a Regional soil laboratory in Khuzistan (paid for out of KDS funds) if the Central Soils Laboratory proved incapable of carrying out the analyses of the required soils samples.

Brief discussions were held with Mr. Shariffie (Director of the Central Soils Laboratory) concerning the technical work, procedures and the ways and means for increasing the output of the Laboratory. A confidential talk was held with Mr. Shariffie (at which only Mr. Davis attended) to ascertain whether Mr. Shariffie was satisfied with the way in which Mr. Davis had arranged the distribution of work in the Laboratory with Messrs. Makitie and Benjaminson. Apparently Mr. Shariffie is completely satisfied with all the arrangements made and had no further suggestions to make. In fact, he expressed himself grateful to FAO for providing such a capable team of analysts.

Mr. Malek Ghassemi (of the Ministry of Agriculture) was advised on the methods of field fertilizer experimentation and on the conducting of pot experiments with test crops.

Field Trip to Khuzistan

I was accompanied on this trip by Dr. Schulze and Mr. Makitie. Mr. Vermeer joined the party at Dezful. During the trip the party stayed at the FAO "Offices" established in the small towns from which the Soil Fertility Teams operate in the different "Centres" - the latter being areas within which agricultural practices, water regime and soil conditions are comparable. These Offices were primarily started because no suitable accommodation could be found for the Iranian engineers working on the Fertility project and for storage of the field equipment and of motor transport. All the "Offices" visited are very efficiently run, KDS paying the rental from their funds and the Iranian engineers paying for their own board. Although the establishment of these "Offices" is a temporary measure to fill the present needs to enable the work on cultivators' fields to be carried out efficiently, it is sincerely hoped that when the present FAO-KDS Soil Fertility Program is concluded, these "Offices" will be perpetuated by the Iranian authorities.

providing information for irrigation development. These three agencies are to be very close to carrying out the plan of irrigation. In fact it was with this thought in mind that the irrigation project was set up over the recommendation of Mr. Hordley Davis, from the U.S. Office of Organization and offered Mr. Hordley Davis a salary of \$15,000 a year and then realized that it was necessary to obtain a satisfactory means to carry out the project for irrigation in the government service. Mr. Hordley Davis, on one hand, as \$15,000 annual salary and on the other decided not to accept Mr. Hordley Davis and then the project will be carried out with the recommendation as soon as satisfactory conditions are met. This Organization is hoping that Mr. Hordley Davis will continue all the work in soil fertility and in soil research and irrigation.

The past work was briefly reviewed with Mr. Hordley Davis and in this phase discussed the need for obtaining all experimental results and stressed and also the need for statistical treatment of the experimental results. This view is also held by Mr. Hordley Davis in connection with the fact that the contract will be renewed. Hordley Davis was made of the possibility of establishing a regional soil laboratory in Washington (at the U.S. Office of the Central Soil Laboratory) to provide facilities for carrying out the analyses of the required soils samples.

Brief discussions were held with Mr. Hordley Davis (Director of the Central Soil Laboratory) concerning the technical work, procedures and the way and means for increasing the output of the laboratory. A confidential call was held with Mr. Hordley Davis (at which only Mr. Davis attended) to ascertain whether Mr. Hordley Davis was satisfied with the way in which Mr. Davis had arranged the distribution of work in the laboratory with respect to Hordley Davis. Hordley Davis is completely satisfied with all the arrangements made and had no further suggestions to make. In fact, he expressed himself grateful to the Government for providing such a capable team of analysts.

Mr. Hordley Davis (of the Ministry of Agriculture) was advised on the methods of field fertilizer experimentation and on the conducting of pot experiments with test crops.

Field Trip to Washington

I was accompanied on this trip by Mr. Hordley Davis and Mr. Hordley Davis. During the trip the party stayed at the U.S. Office of Organization in the main house where the Soil Fertility Team operates in the different "Centers" - the latter being areas within which various projects are carried out. These Offices are separate. These Offices were primarily set up for the purpose of making the field experiments and for working on the fertility project and for storage of the field equipment and for transport. All the "Offices" which are very efficiently run, the project from field tests and the field experiments being for field tests. Although the establishment of these "Offices" is a temporary measure to be carried out the present needs to enable the work on soil fertility to be carried out efficiently, it is strongly hoped that when the present 10-15 Soil Fertility Program is completed, these "Offices" will be purchased by the American authorities.

as focal points from which the agricultural work with the landlords and cultivators can continue. The location of the "Offices", the agriculture Centres they serve, the distribution of Iranian engineers and the main crops of the agricultural areas are given in the Appendix. The "Offices" and the Centres visited during the six day trip were as follows:-

Kermanshah (Chenchanli and Dinavar)
Khorramabad
Dezful (Shohan, Shustar, Hossein, Abad, Shush)
Ahmaz.

During the trip it was possible to observe not only the fertilizer tests which have already been established, but also the procedures used for laying out such experiments. The systematic manner in which the Iranian engineers take charge of this work and keep the necessary records and the precision of the village workers who are assisting and the speed with which the tests are established is most impressive and speaks highly for the training the Iranian engineers have received, from the FAO Team.

At Kermanshah and Dezful I was given an opportunity to address the greater number of Iranian engineers in the FAO-KDS team. An evaluation of the work being done was given, its importance stressed and the engineers were told of what is being done by FAO in the field of soils in other countries. At the end of my talk there was a period for questioning.

At Dezful a brief discussion took place with the KDS soil fertility specialist, Dr. Simkins (who is supervising the large field fertilizer demonstration which KDS is undertaking itself, leaving FAO to carry out the testing on cultivators' fields and the more complex fertilizer experimentation). From this discussion with Dr. Simkins it was evident that there is complete accord between FAO and KDS on fertilizer testing, experimentation and demonstration.

Every opportunity was taken at the sites of the tests on cultivators' fields to discuss the work with the headmen of the village, the cultivators themselves and representatives of the landlords. I gained the impression that all concerned were very interested in the field tests and were desirous of obtaining more fertilizers for their own use. The general explanation given to them was that, at present, tests are being carried out to ensure that the appropriate fertilizers be used. When sufficient information has been gained, the Government will attend to their needs. The hospitality of the villagers was characteristic of the East and copious quantities of tea were consumed. One of the most interesting luncheons was attended on the farm of Mr. K. Nassery who, in the past, has been a very high official of the Ministry of Agriculture and now operates a modern farm near Shush on land rented from his wife. He has several thousand acres under his own management and intends to build up a dairy herd. At present a variety of crops are grown using machinery and tractors for cultivation. He has been cooperating in the FAO-KDS fertilizer tests and is also growing large quantities of sugar cane to provide cuttings for the Dezful Region (one of the KDS projects). His conversations were all the more interesting since he has had government experience at a high level and understands the problems of his country. He is fully conversant with the problems of landlord and cultivator relationships and for some time he has been operating a very large farm in partnership with Mr. Khensari. His policy is to help the cultivators.

to help themselves and to help to raise their standard of living, through education.

The FAO party returned from Dezful by night train to Teheran after a very satisfying trip. In the light of what the FAO party saw in the Ahvaz District, and in other parts of the Dezful Plain, we would like to suggest that an FAO farm machinery specialist visit this area to determine the suitability of the powered implements presently in use. It was observed that discs were used in the preparation of seed beds leaving the soil in a pulverised condition. After irrigation, the soil is badly puddled and, upon drying, bakes hard thus preventing proper seed germination.

to help themselves and to help to raise their standard of living, through education.

The 740 party returned from London by night train to London after a very interesting trip. In the light of what the 740 party saw in the American States and in other parts of the United States, we would like to suggest that on the 740 party's special trip this time we should determine the suitability of the proposed experiment personally in case. It was observed that there were need in the case of a person of good body leaving the soil in a pulverized condition. After this, the soil is badly pushed and, upon drying, takes long time preventing proper seed germination.

APPENDIX

FAO - KDS Soil Fertility Program 1958/59

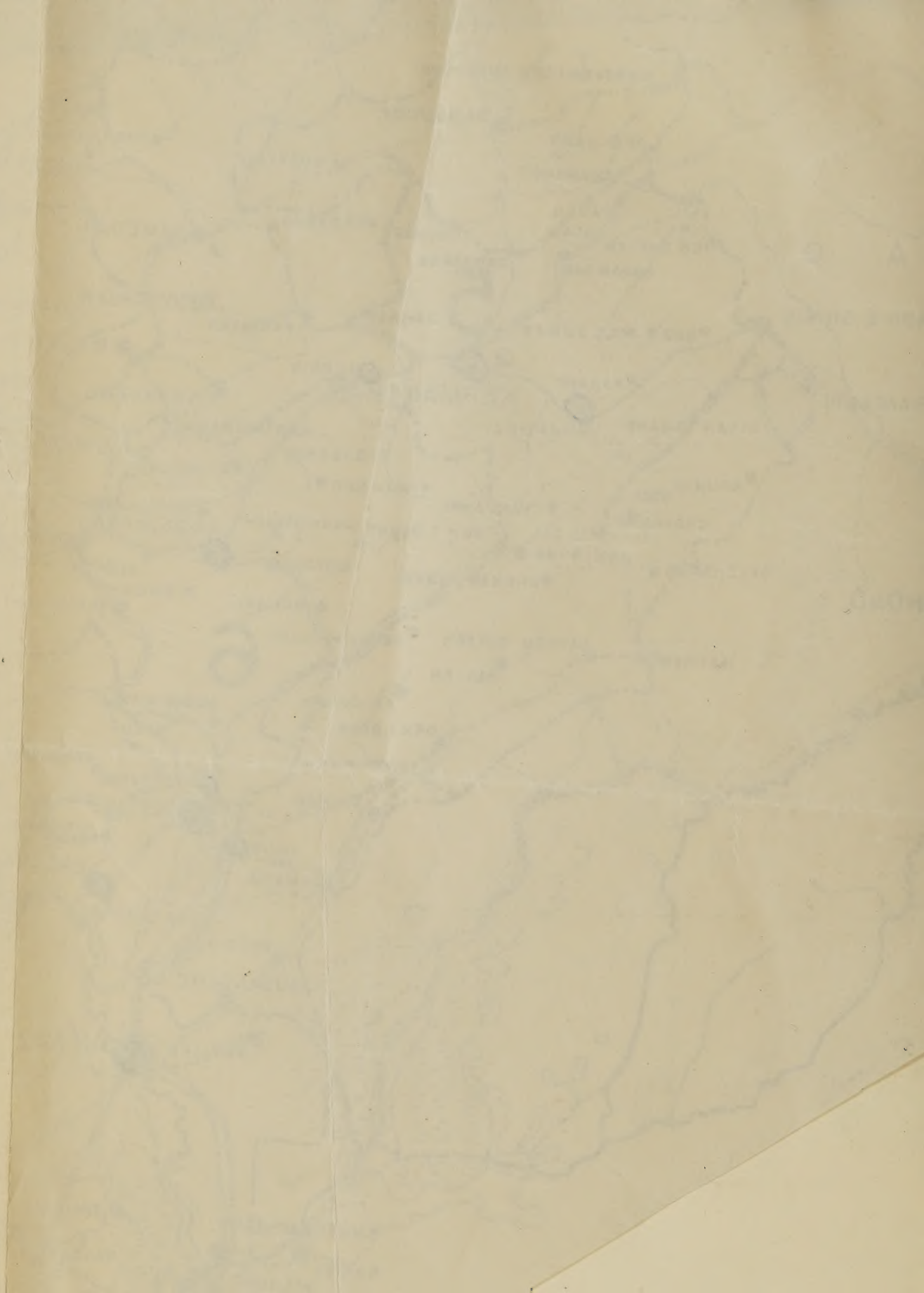
Office	Centres	Number of Engineers	Number of Village Workers	Number of Motor Vehicles	Crops for Testing Fertilizers
KERMANSHAH	Kermanshah	2		2	Wheat, Cotton
	Harsin	1	25	1	Sugarbeet
	Shahabad	2		1	Melons, Grapes
	Khorramabad	2		1	Vegetables
DEZFUL	Andimeshk	2		1½	Wheat, Barley
	Dezful West				Rice, Sesame
	Dezful North	2		1½	Flax, Sugarcane
	East and South				
	Shashtar	2		1½	Broad beans
	Hosseiniabad	2		1½	Alfalfa, Clover
AHWAZ	Shush				
	Ahwaz	2		1	Barley, Wheat
	Hamadien				Alfalfa, Clover
BENBEHAN	Susanguird				Beans, Leaks
	Benbehan	3		2	Flax, Wheat, Beans, Barley, Rice, Cotton, Sesame, Tomatoes, Potatoes, Onions

The fertilizer tests on cultivators' fields for cereals are of the following general design: $O; N_1; E_2; P_1; P_2; N_1P_1; N_1P_2; N_2P_1; N_2P_2; N_1P_1K_1$ - with legumes the nitrogen alone plots are omitted. The rates used are $N_1 = 30 \text{ kg. N/h}$; $P_1 = 30 \text{ kg. P}_2\text{O}_5/\text{h}$; $K_1 = 30 \text{ kg. K}_2\text{O/h}$. In addition to the simple tests on cultivators' fields, complex field fertilizer experiments are being conducted at all Centres with wheat. These experiments include the factorial design for NPK treatment; the testing of four different nitrogen carriers at 3 levels with a basic dressing of P; N top dressing experiments. At some Centres, N carriers are also tested with barley, rice, cotton, sugarbeet, flax and sesame.

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Part of
Iran



Note prepared by Dr. Dewan and some of his F.A.O. soil colleagues with special reference of surveying the soils under the Irrigation Bonfha to plan Soil Service of Iran Organization

The task of a Soil Service for Iran, as also for any other country, is to study and classify soils, to tackle the soil problems of the country and to utilise the soils according to their capability for land resource development (co-ordinated with other resources) leading to a permanent agricultural system. Very little is known at present of the land resources of the vast country of Iran. A survey, designed to acquire knowledge of them so that they can be better understood, has been started with the assistance of F.A.O but it is a long way from completion. The estimate of the land use of Iran given in the table below shows the various categories of land for which soil studies, soil research, and soil resource development will ultimately be required.

Estimated Land Use of Iran, Excluding Wasteland.

Land Use	Million Hectares	As Percentage of total.
Irrigated Areas { Field Crops	0.9	1.2
{ Orchards and Gardens	0.7	0.8
Dry Farming	<u>2.7</u>	<u>3.4</u>
Total area under cultivation	4.3	5.4
Temporary fallow	<u>12.7</u>	<u>16.1</u>
Total Arable Area	17	21.5
Permanent Meadows and Pastures	10	12.7
Forest and Woodland	19	24.0
Unused but potentially productive	<u>33</u>	<u>41.8</u>
	<u>79</u>	<u>100.0</u>

Wasteland (mountains, deserts, etc) occupies 86 million hectares. The land considered in the above table thus represents 48% only of the total area of Iran.

A chart given in Appendix I indicates these land use figures pictorially.

To carry out complete soil studies of the categories of land enumerated above five main branches of endeavour are needed, logically, in the field of Applied Soil Science in Iran.

1. Soil Survey and Classification.
2. Soil Analysis.
3. Soil Management, including Soil Fertility.
4. Soil Conservation.
5. Soil Research.

In 1952-53 F.A.O was asked by the Government of Iran to provide technical assistance in the field of Land and Water Use. As a result one F.A.O Soil Survey Expert, one Soil and Water Conservation Expert, and one Salinity and Drainage Expert, together with other experts on

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Estimated Land Use of Iran, Including Watershed.

Land Use	Million Hectares	As Percentage of total.
Unused but potentially productive	73	100.0
Forest and Woodland	13	17.8
Permanent Meadows and Pastures	19	24.0
Total Arable area	18.1	24.7
Temporarily fallow	4.1	5.4
Total area under cultivation	2.7	3.4
Dry Farming	0.7	0.8
Orchards and Gardens	0.9	1.2
Irrigated Areas		
Field Crops		

Watershed (mountains, deserts, etc) occupies 86 million hectares. The land considered in the above table thus represents 48% only of the total area of Iran.

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1. Soil Survey and Classification.
2. Soil Analysis.
3. Soil Management, including Soil Fertilization.

Hydrology, Irrigation Agronomy, etc., were sent as members of the F.A.O Land and Water Use Team (F.A.O Irrigation Team). Many other soil experts (see Appendix II) have since been in Iran for varying periods of time.

Training in the field of Soil Survey and Classification has been given (to varying degrees) to 23 agricultural graduates (engineers), of whom 15 are still working in the Soil Survey Section of the Soil Department. 5 of these were sent to U.S.A. and Holland for 12 or 15 months, 4 by F.A.O and 1 by I.C.A.'s funds; and some of the others are also receiving additional training. 42 Soil Survey and Land Classification projects have been completed in various parts of Iran. A list (Appendix III) indicates the area surveyed, the personnel involved and the ~~capital~~ organisation which sponsored and financed each project.

A Central Soils Laboratory was recommended and space donated by the University of Teheran has been utilised to construct a three storeyed building, completed in May 1956 (the cost of building - 10 million rials - was given by Plan Organisation; equipment worth 80,000 dollars was given by I.C.A.). At present, three F.A.O Soil Chemists, one Director, five Chemists, four Assistant Chemists, and two Laboratory Assistants man this Laboratory. Up to date it has analysed partially or completely 3,961 soil samples and 993 water samples. Appendix IV gives a list of the soil samples analysed together with the organisation^{or} agency which sponsored or submitted them.

In the field of Soil Management and Fertility one project initiated by F.A.O - K.D.S (an agency of Plan Organisation) is in operation in the Khusistan River basin. Under this project two F.A.O experts and over 20 Iranian Engineers are conducting fertility trials with different crops on Farmers' Fields. K.D.S. has in addition two other foreign soil fertility experts and a few Iranian Engineers. Plan Organisation has also embarked on a national soil fertility programme wherein three foreign experts are expected to advise a large Iranian group working under the administration of the Chemical Section of the Agricultural Division of Plan Organisation.

Soil Conservation in Iran, as in any other part of the world, has to be team work involving soil scientists, agronomists, hydrologists, forestry experts, agricultural engineers and even sociologists and administrators. Almost no work has been done in this field. A draft report embodying "Notes and Recommendations on Soil and Water Conservation in Iran", prepared by F.A.O has been issued to the Government for discussion. In what way the Soil Conservation work would be co-ordinated or correlated with the

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development of the land resources of Iran is to be tackled successfully.

Due appreciation may be paid to the Irrigation Bongah of the Ministry of Agriculture for taking the initiative in the establishment of the Soils Department, which has worked so far as successfully as it has been possible under very difficult and trying conditions. But in view of the Plan Organisation's very big and extensive soil fertility programme on a wide national basis and considering the numerous soil problems involved in this and the large soil survey and classification programme, it is felt that the time has come to think more seriously of the establishment of an Independent Soil Department or a Soil Institute under the control and guidance of a high-powered director.

Until such an independent Soil Institute comes into existence it is suggested that, perhaps as a temporary measure for a period of three years, the entire work on soils should be taken over by Plan Organisation and brought to a high level of efficiency. While it is acknowledged on all sides that the support of the Bongah Abiari has been very influential in getting the Soils Department going, nevertheless, as the source of funds is the Plan Organisation and, as has been stated above, the entire Soil Fertility Programme will be in the Plan Organisation, it would be in the fitness of things to bring the entire soil work under this same organisation, until an independent Soil Department or Institute can be formed. Together with this re-organisation, much would be necessary. It would involve full utilisation of all available personnel and facilities and almost certainly the recruitment of extra staff and expenditure on more equipment. A possible organisation chart is suggested in Appendix V.

The appendices to this note are not included because they were not available when I was leaving Tehran.

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It is suggested to the Committee for the Soil Fertility Programme that the entire soil work should be taken over by the Plan Organization until an independent Soil Department or Institute can be formed.

Plan Organization is a body set up by the Government of Iran for the development of the country. This body has considerable funds from oil revenues and considerable authority.

Another advantage is that it appears to be "above the law" in other words the "red tape" with which all the ministries are weighted down does not seem to "entangle" the Plan Organization at least not to the same extent.

KDS (Khuzestan Development Service) is the organization set up by Leventhal & Clapp in Iran for the development of Khuzestan region. KDS is regarded as the Iranian Government agent because there is a contract between KDS and the Government of Iran to carry out certain development jobs.

PRODUCTION OF PRINCIPAL AGRICULTURAL COMMODITIES - IRAN

1950 - 1957.

(In Metric Tons)

Commodity	1950	1951	1952	1953	1954	1955	1956	1957
Wheat	2,000,000	1,800,000	2,057,000	2,125,000	2,100,000	2,300,000	2,250,000	2,800,000
Barley	800,000	720,000	840,000	820,000	824,000	880,000	880,000	1,000,000
Rice (milled)	285,000	250,000	295,000	350,000	367,500	225,000	350,000	340,000
Other grains	62,000	55,800	65,000	65,000	60,000	60,000	60,000	61,000
Pulses	130,000	126,000	130,000	132,000	135,000	135,000	135,000	136,000
Vegetables & Melons	800,000	790,000	795,000	800,000	800,000	900,000	900,000	910,000
Fresh fruits (non-citrus) & berries	800,000	810,000	800,000	795,000	810,000	800,000	800,000	850,000
Oranges & Tangerines	45,000	45,000	45,000	45,000	45,000	40,000	45,000	44,000
Other Citrus	60,000	55,000	50,000	55,000	55,000	60,000	60,000	61,000
Raisins	45,000	49,500	45,000	48,000	50,000	60,000	62,000	62,500
Dates	138,000	124,200	139,000	125,000	140,000	100,000	130,000	105,000
Dried Apricots	6,300	8,160	7,200	7,500	8,500	5,500	8,000	10,000
Other Dried Fruits	45,000	49,000	45,000	48,000	48,300	48,500	48,700	49,000
Almonds (shelled)	6,500	7,000	7,000	6,000	8,000	4,300	4,500	7,000
Pistachio (unshelled)	3,500	2,500	3,500	1,500	10,000	1,800	2,000	7,000
Walnuts (shelled)	5,500	6,000	6,000	5,000	6,000	6,000	6,000	6,100
Hazelnuts (unshelled)	400	500	500	500	500	550	550	560
Other nuts	19,000	20,000	19,000	19,500	20,000	19,000	20,000	21,000
Sugar	55,224	60,000	71,200	70,000	62,205	75,300	84,000	87,500
Tea	5,000	5,200	5,500	5,600	5,700	5,900	6,400	6,600
Animal Fats	20,000	20,000	21,000	21,500	20,000	21,000	22,500	22,600
Vegetable Oils	11,230	10,420	11,500	12,000	16,100	16,100	17,500	17,000
Tobacco	15,053	12,140	13,450	18,520	12,290	11,230	14,360	17,000
Cotton	28,000	27,000	36,000	52,000	60,000	60,000	62,000	61,000
Wool	14,800	15,500	16,600	17,000	18,000	19,500	20,000	19,500
Cotton Seed	56,000	72,000	84,000	100,000	90,000	110,000	124,000	125,000

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~~DETAILED~~ LEGEND OF SOIL MAP
OF IRAN.

I. ALLUVIAL

- a. Young Alluvial on level
on slightly sloping
- b. Saline Alluvial.
- c. Hydromorphic Saline Alluvial
- d. Hydromorphic Alluvial

II. HYDROMORPHIC AND MARSHY SOILS

- a. Pseudo-~~G~~^Gley
- b. Humid Meadow
- c. Low Humic Gley
- d. Humic Gley
- e. Marshy

III. SOLONCHAK AND SOLONETZ SOILS

- a. Solonchak
- b. Solonetzic Solonchak (without Solonetzic^B)
- c. Solonetz (with Solonetzic B)

IV. REGOSOLS

- a. Sand Dunes *Fixed*
- b. ~~Moving~~ ^{Moving} Coastal Sands and Sand Beaches
- c. Unconsolidated Soil Material

V. DESERT AND RED DESERT SOILS

VI. SIEROZEM SOILS (Gray Desert Soils)

- a. Level or nearly level (0.2%)
- b. Gently to moderately sloping (3-8%)
- c. Strongly sloping (8% +)

VII. BROWN STONY SOILS

- a. Level or nearly level
- b. Gently to moderately sloping
- c. Strongly sloping

VIII. CHESTNUT SOILS

- a. Moderately sloping
- b. Strongly sloping

IX. RED BROWN SOILS

(Frequently with some stony material)

X. NON CALIC BROWN

STONY

Brown soil with stony

XI. BROWN FOREST SOIL

XII. REDDISH SOILS

Moderately to strongly sloping soils

XIII. SOILS OF MOUNTAINS AND VALLEYS (Continued)

1. a) Rough Brown Soil

(Best & stony soil material)

b) Rough Mountainous Soil

2. a) Rough Broken Soil

(on Brown Soil material)

b)

(over volcanic & igneous rocks)

3. a)
b)

(over Brown Forest Soil material)

4. a)
b)

(in Red & reddish soil material)

5. a)
b)

LIST OF SOILS REPORTS

A. THE FOLLOWING REPORTS ON SOIL SURVEY AND LAND CLASSIFICATION OF VARIOUS PROJECT AREAS HAVE BEEN PREPARED BY THE IRANIAN ENGINEERS IN THE SOILS DEPARTMENT OF IRRIGATION BONGAH WITH THE ASSISTANCE AND GUIDANCE OF SOIL EXPERTS OF F.A.O.

Sl. no.	Project area	Ostan	Area surveyed ha	nature of survey	year and month of report	kinds of maps made	Scale of maps	Engineer party leader	FAO Expert
1.	Karkheh (Part I & II)	Khuzistan	57.000	Semi-detailed	May 53	1+	1:50.000	-	M.L. Dewan, T.H. Day & W.A. Sparwasser
2.	Omidieh	Khuzistan	45.000	Reconnaissance	Aug. 53	1+	1:50.000	-	T.H. Day
3.	Zayandeh Rud	Isfahan	200.000	Semi-detailed	Nov. 53	14+	1:20.000	-	M.L. Dewan
4.	Mohammadabad	Isfahan	250	Detailed	Nov. 53	3+	1:100.000	-	M.L. Dewan
	Agric. Farm					1+	1:5.000	Famouri	M.L. Dewan and T.H. Day
5.	Golpayegan (Part I)	Isfahan	7.400	Semi-detailed	Nov. 53	1+	1:20.000	Famouri	T.H. Day
6.	Karkheh (Part III)	Khuzistan	13.000	Semi-detailed	June 54	2+x	1:50.000	Famouri	T.H. Day
7.	Chabankareh	Fars	30.000	Semi-detailed	June 54	2+x	1:20.000	Zaringhalam	T.H. Day
8.	Ahu Dasht	Khuzistan	54.000	Semi-detailed	June 54	1+	1:50.000	Farmanara	T.H. Day
9.	Karaj	Ostan 1	55.000	Reconnaissance	Aug. 54	1+	1:50.000	Yousefi	M.L. Dewan
10.	Saveh	Ostan 1	60.000	Semi-detailed	Nov. 54	3+xs	1:50.000	Haghiri	M.L. Dewan
11.	Garden City	Khuzistan	1.500	Detailed	Apr. 55	3+xs	1:10.000	Mahoutchi	M.L. Dewan
12.	Project Ahwaz								
12.	Gutwand (Part I & II)	Khuzistan	126.000	Semi-detailed	June 55	5+xs	1:10.000	Farmanara	M.L. Dewan
13.	Bajgah Expt. Station	Fars	300	Detailed	55	1+	1:3.000	Vakilian	M.L. Dewan
14.	Doroodzan (Part I & II)	Fars	132.000	Semi-detailed	1955-56	3+sw	1:50.000	Vakilian	M.L. Dewan
15.	Land Resources of Khuzistan	Khuzistan	3.000.000	Broad Reconnaissance	Jan. 55	3+sw	1:500.000	-	M.L. Dewan
16.	Gallegah	Fars	55.000	Semi-detailed	Apr. 56	1+	1:20.000	Vakilian	M.L. Dewan
17.	Kunjam Cham	Kermanshah	10.000	Semi-detailed	Apr. 56	1+	1:20.000	Fahimi	M.L. Dewan
18.	Dasht-i-Zohab	Kermanshah	9.700	Semi-detailed	May. 56	1+	1:20.000	Ganjini	M.L. Dewan
19.	Karkheh Right Bank (Part IIIA)	Khuzistan	6.250	Detailed	56	4+	1:5.000	Yousefi	M.L. Dewan
						1+	1:20.000		

Sl. Project no. Area

Ostan

Area surveyed nature of survey ha

year and month of report

kinds of maps made

Scale of maps

Engineer party leader

FAO expert

20.	Seistan	Ostan VIII	290.000	Reconnaissance	Oct. 56	4 $\frac{1}{2}$	1:20.000	Famouri	-	
21.	Agriculture Bongah	Azerbaijan	150	Detailed	Nov. 56	1 $\frac{1}{2}$	1:100.000	Samadi	M.L. Dewan	
22.	MianDoab Gheshm Island	Kerman	2.040	Semi-detailed	Apr. 57	1 $\frac{1}{2}$	1:50.000	Vakilian	M.L. Dewan	
23.	Pai Posht Doroodzan (Part III)	Fars	5.400	Semi-detailed	Apr. 57	2 $\frac{1}{2}$	1:50.000	Vakilian	M.L. Dewan	
24.	Zarrineh Rud (Part I & II)	Azarbaijan	114.000	Semi-detailed		2-OF 4 $\frac{1}{2}$ SW	1:50,000 1:100.000	Ganjini	M.L. Dewan	
25.	Golpayegan (Part II combined with Part I)	Ostan 10	10.970	Semi-detailed	Dec. 57	1	1:20.000	Ganjini	M.L. Dewan	
26.	Bampur	Baluchstan	9.960	Semi-detailed	Feb. 58	2-0	1:50,000 } 1:20,000 }	Samadi	M.L. Dewan	
27.	Moghan	Azerbaijan	30.000	Semi-detailed		2	1:50,000	Yousefi++	? L. Dewan	
28.	Garmsar Plain	Ostan 2	54.000	Reconnaissance	Aug. 58	3-++	1:60.000	Famouri	M.L. Dewan	
29.	Garmsar-Nuraddin Dasht-i-Kavir	Ostan 2	1.100	Detailed	Aug. 58	1.0 2.0	1:5000	Ganjini	M.L. Dewan	

Lands

C. THE FOLLOWING SOIL SURVEY REPORTS HAVE BEEN ISSUED UNDER KHUZISTAN DEVELOPMENT SERVICE (AN AGENCY OF PLAN ORGANIZATION) FUNDS IN TRUST AGREEMENT WITH F.A.O., AND TOGETHER WITH THE PARTICIPATION OF THE SOILS DEPARTMENT OF THE IRRIGATION BONGAH.

30.	Dezful I	Khuzistan	54.000	Semi-detailed	Apr. 57	2 $\frac{1}{2}$	1:50.000	Famouri	J.P. Creswick	
31.	Dezful II	Khuzistan	54.000	Semi-detailed	July 57	2 $\frac{1}{2}$ ou	1:50.000	Famouri	A.K. Ballantyne	
32.	Kermanshah Plain (Karkheh headwaters)	Kermanshah	70.000	Semi-detailed	Jan. 58	3 $\frac{1}{2}$ ox	1:50.000	Bordbar	V.S. Subramanian & A.K. Ballantyne	
33.	Northern headwaters area of the Diz	Kermanshah		Reconnaissance	Dec. 57	1 $\frac{1}{2}$	2:250.000	-	A.K. Ballantyne	
34.	Aqili plains	Khuzistan	10.000	Semi-detailed	Feb. 58	3-ou	1:25.000	Bordbar	V.S. Subramanian	
35.	Dezful III	Khuzistan	57.000	Semi-detailed	Aug. 58	3-ou	1:50.000	Bordbar	V.S. Subramanian & A.K. Ballantyne	
36.	Dezful peninsula	Khuzistan	400	Detailed	July 58	3- 9	1:10.000	Samai	J.S. Veenenbos	
37.	Karkheh Head-water area (maps only)	Kermanshah	450.000	Reconnaissance	June 58	3- 9 ++ 2-	1:250.000 1:100,000	Farmanara	J.S. Veenenbos	

- 5.1. Geology as related to soils and water by D.S. Gracie
- 5.2. Soil Surveys in Khuzistan - general results by M.L. Dewan
- 5.3. Soil Surveys of Special Areas by M.L. Dewan
- 5.4. Observations on groundwater in the Khuzistan plains by M.L. Dewan
- 5.5. Salinity, Alkalinity and Drainage by D.S. Gracie
- 5.6. Erosion in Khuzistan by M.L. Dewan and J.G. Vermaat
- 5.7. Land resources of the Upper Karkheh basin by M.L. Dewan
60. Report to the Government of Iran on Development of Golpayengan's Land and Water Resources by F.A.O. Irrigation Team 1957.

E. IN ADDITION, FEW PAPERS HAVE BEEN PUBLISHED IN SAME PERIODICALS AS FOLLOWS:

61. M.L. Dewan "Pigeon Towers Aid Iran's Agriculture Economy" Middle East Reporter, VI, No. 2, September 23, 1954.
62. M.L. Dewan "Modification of Soil Texture" Journal of Soil and Water Conservation in India, Vo. 3, No. 1, pp 37-38, 1954.
63. M.L. Dewan "Pigeon Towers and Pigeon Guano in Iran", World Crops, Vol. 7, no. 3, March 1955.

October 1958.

M.L. Dewan
FAO Soil Survey Expert in Iran

0 Soil Map
+ Land Classification Map
x Drainage Investigation Map
u Land Use Map
s Soil Salinity Map
w Wetness Map

GEOGRAPHY OF INDIA

India, also known by the ancient name BHARAT, is situated at the Centre of the Continent of Asia. It measures about 2,000 miles from north to south, and about 1,700 miles from east to west. It has a land frontier 8,200 miles long and a coastline of about 3,700 miles long. The total area of India is 1,259,119 square miles. In area it is the fourth largest country in the world -- $\frac{1}{33}$ part of the land surface of the globe, equal to Europe minus U.S.S.R., half of the United States of America and 12 times bigger than British Isles.

All the natural phenomena of the world are to be found in India -- high mountains, deep forests, high seas and bays, lakes, waterfalls, gorges, fountains, different climatic conditions, almost all the living animals, and almost all the known mineral deposits.

There are four main physical regions in India:-

- (i) The Great Himalayan Ranges: They play an important part in the climate of the country. Many big rivers of India have their origin from these mountain ranges, receiving water from the large melting snow.
- (ii) The Indo-Gangetic Plain: The plain is about 1,500 miles long and about 150 to 250 miles broad. It covers $\frac{1}{3}$ area of the whole of India. This alluvial plain of Northern India is very productive, and is the centre of population and North Indian culture.
- (iii) Peninsular Hills and Plateaus: It is an extensive area with great variations.
- (iv) The Coastal Strips: The Western Coast is narrow (about 30 to 40 miles broad) and the Eastern Coast is wider (about 100 miles broad).

CLIMATE:

India enjoys a monsoon-tropical climate. The whole country is influenced by mon-soon winds. Considering the permanent wind belt of the world, India lies in the North East Trade Wind belt. In summer the winds blow from South West and in winter from North East. The seasons can be classified as:

- (a) Cool season from October to end of February,
- (b) Hot weather from March to end of June,
- and (c) Rainy weather from end of June to end of September.

RAINFALL DIVISIONS:

The country can be divided into four main parts according to the amount of rainfalls:

- (a) Heavy rain, where the rainfall is more than 80" a year,
- (b) Moderate rainfall, i.e. 40" to 80" a year,
- (c) Meagre rainfall, i.e. 20" to 40" a year
- and (d) Dry or semi-deserts, i.e. less than 20" a year.

More than half of India's land surface is covered by forests. Vegetation corresponds to rainfall zones.

SOILS:

The four main classes of soils found extensively in India are:

- 1. Black soils,
 - 2. Red soils (classified as yellow soils),
 - 3. Laterite and lateritic soils,
 - and 4. Alluvial soils.
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INDIAN HISTORICAL AND CULTURAL HERITAGE

The influence of the physiographic environments on the history of the country is nowhere more apparent than in India. In pre-historic ages, desications in Central Asia was one of the causes leading to migration which profoundly altered the history of the Indian sub-continent. Centuries later, within historic times, invaders from the same area affected India's political structure. All these migrations and invasions added to the heterogenety of the existing population.

Before the advent of the European nations by sea India was peculiarly susceptible to invasions through the mountain passes of the north-west. Century after century hoards of invaders swept through these gateways to the Indus and the Plains of the Punjab. All the invaders either founded kingdoms and remained as conquerors or retired leaving behind plundered cities and devastated plains. On three occasions has the fate of Hindustan been decided on the Plains of Panipat: in 1526 when Baber defeated Ibrahim Lodi, in 1566 when Akbar defeated Hemu, and in 1761 when the Mahratas were defeated by Ahmad Shah Durrani. The geographical factor combined with the internal decay was chiefly responsible for this.

The Empire of North India arose in the fertile plains of the Jamuna and the Ganges where the country was able to support a growing population. This was also apparent in the developments of British Rule in India. The concept of a Universal Emperor (CHAKRAVARTIN) and the implications of Horse Sacrifice (ASVAMEDHA) existed long before the time of Alexander. The earliest and the closest approach to unity in Ancient India was under Asoka (273-232BC).

The influence of geography upon history is very clearly marked in the case of the Deccan and Southern India which, because of distance and geographical isolation, have a separate history and cultural development from that of Northern India until the intrusion of foreign nations by sea. However, despite the different development between Northern and Southern India, there has always been a unity which is the conscious achievement of Hinduism.

INDUS VALLEY CIVILIZATION (3,500 B.C. - 2,750 B.C.):

This is the earliest known civilization in India, and is contemporaneous with the civilizations of Mesopotamia and Egypt. It is behavied to be pre-Aryan. Remains of this civilization were excavated at Mohen -jo- Daro and Harappa in the Indus Plains and recently, in Saurashtra, to the north of Bombay and Bikaner. The excavations revealed a well-settled urban life with a drainage system and public baths and large houses. Pottery was known to them and also the use of gold, silver, copper, lead and tin, though not the use of iron.

THE COMING OF THE ARYANS (2,000 B.C. - 1,500 B.C.):

A vigorous nomadic pastoral people came to India from Central Asia in a series of emigration waves. They overcame the original inhabitants and absorbed much of their civilization. The Aryan society was primarily

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agricultural, the cow being the central animal. The Vedas - Rig Veda being the chief of them - the Brahmanas and the Upanishads and the Puranas are the chief books of the Aryans. Hinduism as a religion emerged during this period.

ANCIENT INDIA:

Approximate chronology for North India begins in the seventh century B.C. and for South India at a later date. In the 7th century B.C., North India and part of the Deccan were divided into sixteen principalities (MAHAJANAPADAS). In South India, the Tamil Kingdoms were in existence.

BUDDHISM AND JAINISM (600 B.C.):

In the 6th century B.C. two new religious movements, Buddhism and Jainism, took birth in India. The fundamental principles of Buddha's teachings are: there is suffering in the world, there are causes for this suffering, and the suffering can be stopped by following the Eight-Fold Path, namely, (1) Right speech (2) Right Action (3) Right Means of Livelihood (4) Right Exertion (5) Right Mindfulness (6) Right Meditation (7) Right Resolution and (8) Right View. Buddhists denied the efficacy of Vedic rites for the purpose of salvation -- it was a movement revolutionary in character.

Mahavir, the founder of Jainism, was a junior contemporary of Buddha. In the doctrines of Buddha and Mahavir, there are striking resemblances. At one time the whole country had accepted the Buddhist faith. But Buddhists in India now constitute 0.06 of the population. The percentage of Jains is 0.5.

ALEXANDER'S INVASION (326 B.C.):

In the Spring of 326 B.C. the Greeks crossed the Indus. They were welcomed by the Raja of Taxila. King Porus resisted the foreign invader, but was defeated. Alexander's Indian Expedition lasted for about three years. Alexander's death in 323 B.C. prevented the consolidation of Indian conquests.

MAURYAN EMPIRE (300 B.C. - 185 B.C.):

This has been recognized as the first organized empire in India. The greatest Mauryan Emperor Asoka inherited an extensive empire from his father and grandfather. The only conquest of Asoka was that of Kalinga. He embraced Buddhism and sent missionaries to other Asian countries to preach the doctrine of non-violence. Asoka's rock and pillar edicts show that his Empire covered the whole of India excepting a portion in the extreme south. Asoka followed a policy of non-violence and religious tolerance. This religious policy along with his concept of an empire made him one of the greatest emperors of Indian History.

Hereditary + Council + Ministers

NORTH INDIA (200 B.C. - 320 A.D.):

After the death of Asoka, the Mauryan Empire broke and failed to resist fresh onslaught from outside. First the Sakas and the Kushans dominated North-West India. The Satraps who were the descendants of the Sakas established themselves in Central India while the Kushan Empire extended in North India.

GUPTA EMPIRE (320 A.D. - 606 A.D.):

This was a period of a widespread and unified empire. The Guptas became the paramount power in North India. It was an Era of Prosperity or THE GOLDEN AGE which witnessed a revival of Brahmanism. It was also the Classical Period of Sanskrit Literature, Art and Architecture when Kalidasa wrote his Ritusamhara, Meghadute and Sakuntala.

Towards the end of the 5th century A.D. the Gupta Empire was over-run by the Hunas.

SOUTH INDIA (200 B.C. - 600 A.D.):

There is evidence of small principal states that existed during the time of Asoka outside his Empire. After the Mauryan Era, the Andhras established a kingdom along with the Cholas and Pandyas. From the 3rd century A.D. for the next 200 years, we find the Pallavas, the Pandyas and the Chalukyas as the three dominant powers seeking political supremacy. South India always had maritime interests for economic and cultural ties with other countries.

HARSHA'S EMPIRE (606 A.D. - 647 A.D.):

The country again became politically united under Emperor Harsha. Many independent kings accepted his suzerainty. This period saw the perfection of Sanskrit. Prakrit evolved into a literary language and the great University at Nalanda was developed.

MUSLIMS IN INDIA:

For 500 years, India was free from the threat of external aggression. The Indian people became insular in their ideas. The country was economically prosperous; but the political structure was rather weak. The first Muslim invasion took place in 738 A.D. but the Muslims met with little success. For over $2\frac{1}{2}$ centuries no further attempts at invasion were made by the Muslims.

MUSLIM RULE IN INDIA (1191 A.D. - 1800 A.D.):

The Turkish invasions which began in the 12th century culminated in the establishment of Muslim rulers in India. These early defeated the Lodi dynasty and were called the Pathan rulers of India. In 1526 Baber established the Moghul rulers of India. Akbar, the greatest of the Moghul

Emperors (1556-1605), had a concept of a united India. He tried to reconcile Hindus and Muslims and to build up a far-flung modern system of administration. His successors enriched the country by building the Taj Mahal and other buildings. In the 18th century weak successors and foreign invasions weakened the Moghul Empire and provided scope for the conflicts for control over the central authority in which the Mahratas and British fought for supremacy. The British succeeded in establishing their sway.

SOUTH INDIA (1191 A.D. - 1800 A.D.):

The Muslim Rule did not penetrate to the South. By about the 9th century the Cholas who were an obscure power till then emerged as the greatest imperial power in the South. This Empire broke up when the great Vijayanagar Dynasty arose in the 14th century.

BRITISH PERIOD (1859 A.D. - 1947 A.D.):

The British Power was established in India slowly since 1757. The Great Rebellion of 1857 by the Indian Army against British Rule marked a change in the History of India. India became formally part of the British Empire in 1859 and continued to be so until 1947.

INDIA'S POPULATION

India is the second most populous country in the world with an estimated population of 386 million in 1955. China (Mainland) stands first with an estimated population of 600 million. In 1955, U.S.A. is estimated to have a population of 166 million, U.K. 51 million, Italy 48 million, France 43.3 million, Brazil 59.3 million, Japan 89.1 million and U.S.S.R. 197 million.

The first population census in India was taken in 1872. But it was not a synchronous census. However, from the beginning of the year 1881, a regular census is being taken every ten year. The last census was taken in 1951. Preparations for the 1961 Census are afoot. The Census is being conducted by the Government of India and is looked after by the Census Commissioner and the Registrar General of India. Besides the census, the Registrar General also publishes vital statistics (births and death figures). In addition to these official data, there are few population surveys conducted by research bodies in India. These surveys throw light on some important aspects of India's population.

India's population in 1891 was 236 million. It increased to 248 million in 1921 and to 357 million in 1951. Thus while in thirty years between 1891-1921 her population increased by 12 million, between 1921-51 it increased by 109 million, that is, nearly nine times more. The present rate of growth is estimated to be 1.5 per cent per annum. This rapid population growth in recent decades has been made possible by declining death rate brought about by increasing control on diseases and epidemics. The death rate has declined from 44.4 per thousand in 1891-1900 to 27.4 in 1941- 1950. Infant mortality has declined from 205 per thousand live births in 1911 to 114 in 1954. It is expected that with the introduction of improved health and sanitary measures in rural areas, increasing use of anti-biotic drugs, B.C.G. Campaign and D.D.T. spraying, death rate may decline to about 12-15 per thousand within few years, which is comparable to Western countries.

India is at present divided into 14 states. The following table gives the area, population and the density of various states as of 1951:-

T A B L E: I

Population, Area, and Density of Different States, 1951

<u>STATE</u>	<u>AREA</u> (in Sq. miles)	<u>POPULATION</u> (in million)	<u>DENSITY</u>
Andhra Pradesh	105,700	31.3	296
Assam	85,062	9.0	171

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<u>STATE</u>	<u>AREA</u> (in Sq. Miles)	<u>POPULATION</u> (in million)	<u>DENSITY</u>
Bihar	67,113	38.8	578
Bombay	190,668	48.3	253
Kerala	14,937	13.5	907
Madhya Pradesh	171,300	26.1	152
Madras	50,174	30.0	597
Mysore	74,861	19.4	259
Orissa	60,250	14.6	243
Punjab	47,062	16.1	343
Rajasthan	132,098	16.0	121
Uttar Pradesh	113,423	63.2	557
West Bengal	33,885	26.3	776
Union Territories	30,147	4.0	148
INDIA	1,176,680	356.9	312

According to the 1951 Census nearly 80 % of India's population lives in villages. There are 558 thousand villages in India and three thousand towns.. Out of 3,000 towns, 73 are big cities with a population of one hundred thousand, and over, 485 big towns with a population between twenty to one hundred thousand, 1848 minor towns with a population between twenty to one thousand and 612 townships with a population below five thousand. Greater Calcutta is the biggest city of India with a population of 4.6 million. Greater Bombay is second with a population 2.8 million. Delhi comes fourth (after Madras) with a population of 1.4 million. The present population of Greater Delhi is estimated to be 2.3 million.

Hindusim is the dominant religion of India. Islam comes second. The following table shows the per cent of population belonging to different religions in India:-

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T A B L E : IIPercent of Population of India by Religion

RELIGION	1 9 2 1	1 9 3 1	1 9 4 1	1 9 5 1
Hindu	70.7	70.7	69.5	85.0
Muslim	23.2	23.5	24.3	9.9
Christian	1.5	1.8	1.9	2.3
Sikh	1.1	1.3	1.5	1.7
Tribal	3.0	2.3	2.3	0.5
Jain	0.4	0.4	0.4	0.5
Buddhist	0.1	0.1	0.1	0.6
Parsi	0.03	0.03	0.03	0.03
Jewish	0.01	0.01	0.01	0.01

The mean age at which females in India marry is 15.4 years. Thirty years back they were marrying two years younger. Males, on the other hand, marry at the age of twenty. Marriage is universal in India, and by the age thirty-five, 98 % of the females are married. Generally people in the South of India, that is State of Madras, Mysore, Kerala, Andhra marry late. It may however, be noted that the date of marriage is not to be taken to be the date on which husband and wife begin to live together. There is an average gap of two years between marriage and the consummation of marriage. A couple, on an average, has 5.6 to 5.8 surviving children during its married life. The maximum fertility among women is between ages 20 to 35.

Appreciating the gravity and urgency of controlling the population of India, the Government of India allotted Rs. 6.5 million in the First Five Year Plan and has allotted Rs. 49 million in the Second Plan for family planning works. The States have allotted another Rs. 9.7 million. It is proposed that during the Second Plan period 500 urban and 2,000 rural family planning clinics will be opened. Each clinic is likely to serve 50,000 to 66,000 people. During the First Five Year Plan 21 rural and 126 urban clinics were opened. During the first year of the Second Plan 7 rural and 13 urban clinics were started. During the second year significant progress was made and 139 rural and 127 urban clinics were sanctioned. The family planning programme is making steady progress. The Government of India have also given grant to open Demographic Research Centres and three such centres are working in India.

TEMPLES OF INDIA

Indian Temple Architecture has had an individuality of its own. It exhibits a rare aesthetic sense combining skill and beauty with durability and utility. Temples in India are not only known for their quantity but also for their quality. The creation of the Indian temple was the result of man's urge to express HIMSELF or give expression to his divine self. The temples depict scenes drawn from the divine deeds of Gods called LILAS, principally on the Brahmanical side of the three major deities: BRAHMA, the creator, VISHNU, the preserver and SHIVA, the destroyer, and on the Buddhist side, the life of the Buddha and his past births (jatakas) and on the Jaina side, the lives of their 24 Tirthankaras or "World Teachers". The structural class is grouped under three main heads or styles of architecture. These groups are the square and the rectangular or NAGARA, the round and the apsidal or VESARA and the octagonal or DRAVIDA.

PRE-VEDIC INDIA: Archaeological excavations at Mohenjo-Daro in Sind and Harappa in the Punjab revealed that there existed a highly developed civilization rich in the works of art, religion and picto-graphic system of writing, dating from the 3rd millennium B.C.; but Mohenjo-Daro or Harappa shed poor light on the architectural form of the temple of the 3rd millennium B.C.

VEDIC INDIA: No vestiges of religious monuments of the Vedic Age have survived. Worship, as one can glean from the Vedic hymns, was complicated and endless, though exalted and refined. The many sacrificial worships described in the Vedas are meant for the exclusive benefit of the performer. The sacrificial performer was concerned with his sacrifices and daily fire worship. He has left some YUPA pillars and CAYANA bricks only; the former being of wood have perished and the latter weathered or disappeared in the absence of any associative stable structures.

Devotional architecture which had its humble beginnings in the rock-cut temples at Barabar Hills in Bihar and Khandagiri-Udyaya giri Caves of the 2nd century B.C. in Orissa found its fullest expression and development in many other later cave temples such as the Indra Sabha at Ellora, Sittannavasal and Tirumalai. Sacred places of pilgrimage or TIRTHAS were built on hill tops as in Girnar, Satrunhaya (Palitana) and Mount Abut. These "temple cities" were groups of religious buildings arranged on such level spaces as the contours of the hill could provide. The Mount Abut group like many other medieval masterpieces were the spontaneous expression of the entire Jain community. Khajuraho in Bundelkhand, the old Chandela capital, has a group of Jain (950-1050 A.D.) and Hindu temples which are second in importance and magnificence only to the Bhuvaneswar temples in Orissa.

BUDDHIST INDIA: Lord Buddha, Mahavira's younger contemporary, spread his doctrine by bringing into motion, the wheel of the law (DHARMA-CHAKRA - PRAVARTANA). The places sanctified by the Buddha's association came to be worshipped. Among them were his birth place (Lumbini garden in Kapilavastu) and the places of his enlightenment (Buddha Gaya), first sermon (Sarnath near Benaras) and entry into NIRVANA (Kusinagara). His relics (corporal, associative and dedicatory) were enshrined and adored. Originally

the shrines were raised over pieces of Buddha's bones. On these were planted symbols such as Wheel of the Law, a tree within altar etc. The mounds were encircled by a railing. Gradually stone replaced wood and over the mound was raised a hemispherical dome (ANDA) which in turn supported a square pavilion (HARMIKA) and on which stood the CHHATRA, the umbrella of sovereignty (DHARMA-VIJAYA). The Buddhist STUPA in its classical form was thus created, of which the best examples are those of Sanchi (3rd to 1st century B.C.) in Bhopal, Bharhut (2nd century B.C.) in Central India, Amaravati (1st century A.D.) and Nagarjunakonda (3rd century A.D.) in South India. Caves were hollowed out, divided and decorated. Thus, arose the marvellous Buddhist cave-temples, prayer-halls or VIHARAS, as at Karle, Kanheri, Bhaja, Nasik in Bombay State and Ajanta in Deccan. Painting and sculpture were enlisted to depict the glory of the Buddha and the life of the Master, his past births (JATAKAS) and other edifying legends of moral value. In the north-west, owing to the Greek and Roman impact, a hybrid art developed and a complete Buddhist imagery called GANDHARA was elaborated.

HINDU TEMPLES: The Hindu temple expresses the individual character of the Vedic rites. The presiding deity or god dwells in it in human form - an image or a symbol. The priest arranges for his god a calendar which is one of endless festivals, fairs and processions (UTSAVAS) attracting pilgrims from far off places. Hardwar, Rishikesh, Prayag and Kasi in U.P., Bhuvaneshwar in Orissa, Kamakhya in Assam, Tirupati, Kanchipuram, Kalahasti, Chidambaram, Tanjore, Srirangam, Mathurai and Rameshwaram in South India, are a few of the many places of pilgrimage where great temples were built with amenities such as the bathing tanks, kitchens, rest-halls and stables.

The dynasties that ruled South India expanded the structural formation of the temple to suit the growth of temple-rituals. While the cave temples (cut-in and cut-out), as those at Mahabalipuram, were carved by the Pallava Kings in the 7th and 8th centuries A.D., structural temples with very high VIMANAS over the SANCTUM SANCTORUM, as in Tanjore, came up during the rule of the early Chola Kings (850-1070 A.D.). Huge GOPURAS or gate-ways, such as at Tiruvannamalai and Chidambaram, came up in the later Chola Period (1070-1250 A.D.) and great corridors or corridor halls (PUDU-MANDAPAS), such as in the Madura and Rameshwaram temples, typifying the latest style of the temple development, came up after 1600 A.D.

Side by side with these structural temples the early traditional mode of rock-hewn shelters also continued. Like Jainism and Buddhism, Hinduism has innumerable cave temples of its own. Those that take their place among the greatest works of art are the Elephanta Caves (8th Century A.D.) near Bombay, which were mistaken by early European travellers to be monuments of Alexander and Porus, the Kailasa Temple at Ellora (Deccan) of the 8th century A.D., the famous Rathas of the 7th century A.D. and the Shore Temple of Mahabalipuram of the 8th century A.D.

SOCIAL STRUCTURE IN INDIA

The two basic features of the Indian Social Structure are:

- 1) the caste-system; and 2) the joint-family system.

The caste-system which originated as a functional division ultimately got religious sanction. The original broad classification was of four castes. Today there are hundreds of castes as a result of the further subdivision of the four castes. The four basic castes are: 1) the Brahmin (the priestly class), 2) the Kshatriya (the warrior class), 3) the Vaish (the business class), and 4) the Sudra (the service class).

Although in some cases like the Kumhar (potter) caste or the Lohar (blacksmith) caste the division is functional, it is not necessarily so today. For instance, a Brahmin may be in the army or a Kshatriya doing Business, a Sudra might be an educationist and so on.

It may be said that, though in the villages the functional division still persists, it is no longer so in the urban areas. On the other hand, some of the social taboos that go with the caste-system are still prevalent. There was no social intercourse between the different castes. Inter-dining and inter-marriage were not allowed. However, the first barrier is now breaking down and people do not mind with whom they dine. This is again so in the urbanized areas where people of different castes work together.

There is however some strict observance of the taboos on inter-caste marriage. It is generally found that marriages take place within the same caste. However, inter-caste marriages do take place though they are very few in number.

This system functioned well in a feudal structure of the self-sufficient villages. With the break-up of the villages, together with the development of industrial and urban areas, the rigidity of the system had to crack up under this new pressure.

With a democratic political set up, it is again not possible to have a rigid form of this system. The vote-seeker will have to go to all irrespective of their caste.

The other important element of our social structure is the joint-family system. Under this system, all the sons and their families live together. Generally, the eldest member acts as the head of the family. The earnings of the members are pooled together.

The daughter-in-law comes to the family. They do not lead a separate social existence, save as members of a joint-family. The considerations of the status and character of the families play a very deciding role in the eyes of the elders with whom the responsibility of settling marriage lies. Of course, wishes of the girl and the boy are also taken into consideration.

There has also been the custom to marry a girl at a very young age. The husband and wife never live together until the age of puberty. For a number of years after marriage, the girl alternately lives in her husband's home for some months as the daughter of that family, and going back to her parental home for some months. In this way, she grows up with her husband, gets used to the life in her husband's home, while not getting cut off from her parental home.

Since the girl has to live along with all the other members of the family, it is necessary that she learns the ways of her husband's home. She can learn and accept these only when she is yet mentally immature -- hence the importance of the custom of early marriages.

The joint-family system was an essential part of the village structure. All the members did the same kind of work so that there was no conflict between them. This helped in keeping the ancestral property intact. This property (not the earned incomes) was always jointly owned by all. By this system, for instance, if the father was an agriculturist, then the sons who inherited the land would avoid the sub-division of the land by staying in the joint-family (this does not mean that sub-division and fragmentation of land did not take place at all).

By its very nature, the joint-family system acted as a means of social insurance. If one member was unemployed he would get his share from the family earnings. If one member died, the other members would look after his family. This was done without any sense of obligation on the part of the receiver.

This system is disintegrating. With education and urbanization we find that different members may be doing different kinds of work, having different interests, and earning different incomes. Further, the girls are not married at a much later age. They have their own ideas which may not fit in with the ideas of the other women of the family. All these lead to conflicts within the joint-family. Also in the urban areas the living space available is very small making it impossible to have all the members of a joint-family living together.

However, though the joint-family is breaking up, strong family ties still exist.

NATIONAL INCOME

A proper assessment of the national income of a country and its distribution among the various sections of society is essential for any economic planning. Unless it is known how the income of the country is distributed, any proposals for taxation are likely to be arbitrary.

Before independence, no systematic attempt was made in India to estimate the national income of the country. Some rough estimates were, however, published and made available by individual economists. In August 1949, the Government of India for the first time appointed an official committee of experts to prepare a report on the national income and other related statistics. The First Report of the National Income Committee was released in April 1951, and it was followed by its Final Report in February 1954. The National Income Unit, which had been working under the guidance of this Committee to frame authoritative estimates of National Income, was transferred from the Ministry of Finance to the Central Statistical Organization with effect from June 1, 1954. Since then, the Central Statistical Organization has been publishing an annual paper on national income showing the generating sources and related details.

PRE-PLAN PERIOD:

The following table gives statistics regarding the national and per capita incomes of India for the years 1948-49 to 1950-51 (pre-Plan Period) at current and constant prices:

Year	National Income		Per Capita Income	
	At current prices (Rs. million)	At 1948-49 prices (Rs. million)	At current prices (Rupees)	At 1948-49 prices (Rupees)
1948 - 49	86,500	86,500	246.9	246.9
1949 - 50	90,100	88,200	253.9	248.6
1950 - 51	95,300	88,500	265.2	246.3

These figures show that although the nominal values of the per capita and national incomes (without taking into account the movement of the price level) showed a rise of 7 per cent and 10 per cent, respectively, between 1948-49 and 1950-51, the real values of these (after taking into account changes in the value of money) remained more or less stationary.

SINCE 1951:

With the launching of the first Five Year Plan in April 1951, the first significant upward movement in the national and per capita incomes for several decades started. The national and per capita incomes since 1951-52

at constant prices (without taking into account changes in the price level) and at current prices (after taking into account changes in prices) are:

Year	National income at current prices (Rs. million)	Per Capita Income at current prices (Rupees)	National Income at 1948-49 prices (Rs. million)	Per Capita Income
1951-52	99,700	274.0	91,000	250.1
1952-53	98,200	266.4	94,600	256.6
1953-54	104,800	280.7	100,300	268.7
1954-55	96,200	254.4	102,800	271.9
1955-56 (preliminary)	96,500	252.0	104,200	272.1

It will be seen that, between 1950-51, the Pre-Plan year, and 1955-56, the fifth year of the first Plan, the national income of India rose from Rs. 95,300 million to Rs. 96,500 million, and this in spite of a considerable fall in the general price level between these two dates. Although the nominal value of the per capita income registered a fall between these two dates (from Rs. 265.2 to Rs. 252.0) after allowing for changes in the price level the per capita income showed a rise of about 10.5 per cent from Rs. 246.3 to Rs. 272.1 (at 1948-49 prices). The total national income, computed at 1948-49 prices, rose between 1950-51 and 1955-56 by Rs. 15,700 million or 17.7 per cent from Rs. 88,500 million to Rs. 104,200 million. Thus, even after allowing for the considerable increase in population during this period, the per capita income rose by as much as 10.5 per cent within five years.

Taking 1948-49 as the base year, the indices of per capita real income in India at constant prices are shown below:-

1950-51		99.8
1951-52		101.3
1952-53		103.9
1953-54		108.8
1954-55		110.1
1955-56		110.2

Net National Product by Industrial Origin

The following table gives the distribution of the national income of India for different years among the main types of activity:-

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(In Rs. 100 million at current prices)

	1948-49	1949-50	1950-51	1951-52	1952-53	1953-54	1954-55	1955-56
	1	2	3	4	5	6	7	8
1. Agriculture	425	449	489	502	481	531	435	422
2. Mining, manufacturing and small enterprises	148	150	153	168	170	177	181	187
3. Commerce, transport & communications	160	166	169	179	178	180	181	185
4. Other services	134	138	144	150	154	160	165	171
Total national output at current prices	865	901	953	997	982	1048	962	965
Net national output at constant (1948-49) prices	865	882	885	910	946	1003	1028	1042

In terms of index numbers, the national product at current and constant prices works out as follows:

Year	At current prices	At constant 1948-49 prices
1948-49	100	100
1949-50	104.2	102
1950-51	110.2	102.3
1951-52	115.3	105.2
1952-53	113.5	109.4
1953-54	121.2	116.0
1954-55	111.2	118.8
1955-56	116.6	120.5

The above figures show that between the years 1948-49 and 1955-56 there has been an increase in the total national income, at constant prices, of about 20.5 per cent. The increase in per capita income over the same period has, however, been less significant, i.e. only about 10.2 per cent.

Percentage Distribution

The following table gives the percentage distribution of the national income for different years among the main types of productive activity:-

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	1948- 49	1949- 50	1950- 51	1951- 52	1952- 53	1953- 54	1954- 55	1955- 56
1. Agriculture	49.1	49.8	51.3	50.4	49.0	50.7	45.2	43.7
2. Mining, manufacturing & small enterprises	17.1	16.7	16.1	16.9	17.3	16.9	18.8	19.4
3. Commerce, transport & communications	18.5	18.4	17.7	17.9	18.1	17.2	18.8	19.2
4. Other services	15.5	15.3	15.1	15.0	15.7	15.2	17.2	17.7

The above figures show that, in spite of some advance in the share of manufacturing industries and other services in the total national product agriculture continues to occupy the predominant position. This emphasizes the need for continuing stress on industrialization during subsequent Plan periods.

FIVE YEAR PLANS

The dawn of independence found the country face to face with problems of great complexity. The war and Partition had considerably dislocated the economy. There were scarcities of goods, leading to inflation. Against this, freedom had raised the people's expectations for a higher standard of living. Under these circumstances, the Government of India thought of appointing a Planning Commission to formulate a plan for the fullest utilization of the nation's resources in men, money and materials. Planning was envisaged as the means of giving economic content to political freedom.

The Planning Commission was set up in March 1950. Its objective was to initiate "a process of development which will raise living standards and open out to the people new opportunities for a richer and more varied life".

FIRST PLAN

The draft of the first Five Year Plan was published in July 1951 and it was approved by Parliament in December 1952. This Plan aimed at strengthening the economy at the base and imparting to it a measure of strength and stability. It therefore laid stress on agricultural development and multi-purpose projects. The targets of investment and additional production were kept quite modest. It was thought that the first Plan would lend speed to the stagnant economy and prepare the ground for more rapid development in future.

Investment: Originally, a development outlay of Rs. 20,690 million in the public sector was envisaged for the first Plan. In 1953-54, however, it was felt that the employment situation in the country was worsening and it should be tackled boldly. The Plan was, therefore, strengthened by the inclusion of some labour-intensive schemes and the target of development outlay in the public sector was raised to Rs. 23,560 million. Of this, 16 % (Rs. 3,720 million) was to be spent on agriculture; 28% (Rs. 6,610 million) on irrigation and power; 7 % (Rs. 1,790 million) on industries and minerals; 25 % (Rs. 5,560 million) on transport and communications; 23 % (Rs. 5,470 million) on social services, and 2 % (Rs. 410 million) on other miscellaneous items.

Achievements: The first Plan completed its course on March 31, 1956. The target in terms of development outlay were more or less realized in the case of agriculture, irrigation and power and transport and communications. Expenditure was behind schedule in regard to community projects, education and industries in the public sector. On the whole, the target of development outlay fell short only by about 10 % over the entire five-year period. Looking back at the achievements of this period, it is evident that though the gains were small in comparison to the distance that remained to be covered, the rate of progress was heartening.

The over-all result of the first Plan is reflected in an increase of about 18 per cent in the country's national income. In terms of 1952-53 prices, the national income is estimated to have gone up from Rs. 91,000

million in 1950-51 to about Rs. 104, 200 million in 1955-56. The most significant advance was registered in the field of agricultural production. The output of foodgrains increased by 20 per cent, that of cotton by 45 per cent and major oilseeds by 8 per cent. More than 16 million acres were added to the irrigated land. The output of electricity rose from 6,575 million kWh in 1950-51 to 11,000 million kWh in 1955-56. The index number of industrial production showed an advance of 56 points from 105 in 1950 to 161 in 1955.

A number of new projects were started in the public and private sectors. Considerable investment was made in producer and capital goods industries. Prices fell by about 13 per cent by the end of the Plan period. The balance of payments position showed a favourable trend. External accounts were almost in balance in 1954-55, and ended with a small surplus in 1955-56.

Though the above gains are quite impressive, the country is still far from having a reasonable standard of living. There is much unemployment and under-employment and to make matters worse the population is increasing at the rate of about 1.2 per cent each year.

SECOND PLAN

In formulating the second Five Year Plan, these problems were kept to the forefront. The draft of this Plan was published in February 1956. and the final Plan was approved by Parliament in May 1956. The central objectives of the Plan have been defined as follows:-

- (a) a sizable increase in the national income so as to raise the standard of living in the country;
- (b) rapid industrialization, with particular emphasis on the development of basic and heavy industries;
- (c) a large expansion of employment opportunities, and
- (d) reduction of inequalities in income and wealth and a more even distribution of economic power.

Development Outlay: The total development outlay in the public sector for both the Central and State Governments proposed in the second Plan is Rs. 48,000 million. The distribution of this outlay by major heads of development is as follows:

	(Rs. million)			
	First Five Year Plan		Second Five Year Plan	
	Total provision	per cent	Total provision	per cent
Agriculture and community development	3,570	15.1	5,680	11.8
Irrigation and power	6,610	28.1	9,130	19
Industry and mining	1,790	7.6	8,900	18.5
Transport and communications	5,570	23.6	13,850	28.9
Social services	5,330	22.6	9,450	19.7
Miscellaneous	69	3	990	2.1
T O T A L	23,560	100	48,000	100

It will be seen that there is a considerable shift in emphasis in favour of industries, mining, transport and communications in the second Plan. About half the total expenditure, as compared with about a third in the first Plan, is to be devoted to them. If power is also taken as part of industrial development, the outlay works out to about 56 per cent of the total. In absolute terms the increase in the outlay on industries and mining is about 400 per cent. The outlay on agriculture and community development is about 12 per cent, as against 15 per cent in the first Plan. The proportion of resources allotted to social services and other miscellaneous items is about the same in the two Plans.

Investment: Of the total development programme of Rs. 48,000 million in the public sector, about Rs. 10,000 million represents current expenditure under such heads as education, health, scientific research, the national extension service and the like. The rest of the expenditure represents net investment, i.e., expenditure on building up productive assets. In addition, about Rs. 24,000 million is to be invested in the private sector. Of this amount, Rs. 5,750 million will be invested in industry and mining, Rs. 1,250 million on plantations, transport and electricity undertakings, Rs. 10,000 million on construction, Rs. 3,000 million in agriculture and Rs. 4,000 in stocks.

Taking the public and private sectors together, the net investment in the economy over the second Plan period will amount to about Rs. 62,000 million.

Main Targets: The Plan envisages a significant move forward with regard to basic industries. Three steel plants of about 1 million tons ingot capacity each will be set up. Three more fertilizer factories will be started in the public sector. The production of cement will be raised from the present level of 4.3 million tons to 13 million tons and that of coal from 38 million tons to 60 million tons. The output of railway locomotives will also go up from the present level of 175 to 400 by the end of the Plan.

The target of increase in agriculture was originally fixed at 18 percent. This has now been raised to 28 per cent. The installed capacity of electricity is expected to increase from 3.4 million kW to 6.9 million kW. The emphasis on the development of social services will be continued. Additional educational opportunities will be provided and medical facilities substantially stepped up.

Financial Resources: It is proposed to meet the expenditure in the public sector of the second Plan as follows:

			(Rs. million)
1. Surplus from current revenues	...	...	8,000
(a) at existing rates of taxation	...	...	3,500
(b) additional taxation	...	...	4,500

/Contd... 21.

2. Borrowing from the public	...	...	12,000
(a) market loans	...	7,000	
(b) additional taxation	...	5,000	
3. Other budgetary sources	...	...	4,000
(a) railways' contribution to the development programme...		1,500	
(b) provident funds and other deposit heads		2,500	
4. Resources to be raised externally	...	...	8,000
5. Deficit financing	...	...	12,000
6. Gap to be covered by additional measures to raise domestic resources	...	...	4,000
			48,000

In the meeting of the National Development Council held in December 1956, the target for additional taxation was raised from Rs. 4,500 million to Rs. 8,500 million. In fact, this target may have to be raised further in view of an upward revision in the outlay on the Plan and reduced emphasis on deficit financing.

Foreign Exchange Resources: The second Plan, with its large investment outlay and stress on the development of basic industries, is likely to involve a deficit in the balance of payments over the five-year period of about Rs. 11,000 million. It is proposed to meet part of this deficit by withdrawing Rs. 2,000 million out of the accumulated sterling balances, by the expected inflow of private capital of about Rs. 1,000 million and the balance of Rs. 8,000 million may be met from external aid. Regarding the last item, an unutilized balance of Rs. 3,100 million is available from past authorizations.

Employment: The additional employment likely to be generated by the Plan is estimated at 8 million. In addition, full-time work will be available to about 1.6 million persons as a result of the reclamation of land, extension of irrigation facilities, development of plantations and horticulture, etc. Further employment will also be provided by the programmes of development in village and small-scale industries. A complete solution of the problem will, however, have to await further Plans.

Reduction of Inequalities: An important objective of the second Plan is the establishment of an egalitarian society by demanding greater sacrifices in the task of national reconstruction from people in the higher income groups and by providing more social services and amenities of life to the poorer sections of the community. The Plan seeks to reduce inequalities through fiscal and other devices and at the same time lays emphasis on positive measures for promoting a more even distribution of income.

FESTIVALS

Ranging from austere fasts to exuberant fairs, the festivals of India are as varied and colourful as its people. Hinduism, Islam and Christianity are the three most widely professed religions, and since each has its own particular observances and celebrations, the total number of festivals is very large. Among the Hindus alone, there are about 70. Only a few, however, are widely observed.

Hindu festivals are of four kinds; the festivals proper, 'vratas' (fasts), 'jayantis' (birthdays) and 'melas' (fairs). As a rule, they commemorate events of moral and spiritual significance in the lives of the gods and goddesses of mythology as well as legendary heroes and heroines. Also, certain positions and conjunctions of the planets give certain days a sacred character, e.g., the Purnamashi Vrata (Fast of the Full Moon), which comes once a month. The more important Hindu festivals are Diwali, Basant Panchami, Rakshabandhan, Dusserah and Holi.

DIWALI: Deepavali or Diwali, the festival of lamps, is one of the most popular. It usually falls in October, the date varying from year to year, and celebrates the home-coming of Rama, the hero of the epic Ramayana, after he had defeated the demon king Ravana. Diwali is an occasion for great rejoicing. A few days before the festival, houses are whitewashed, rubbish is disposed of and furnishings renovated. On Diwali morning, every household is up and about very early and people put on new clothes. Visits are exchanged between friends and relations and gifts given and taken. In the evening, rows of earthen lamps are lit on every house-front and roof-top. People go out into the bazars, shopping for presents. Children buy crackers, squibs, catherine wheels and other fire-works. In the evening, the family gathers in the best room of the house and performs the Diwali puja, when prayers for success and prosperity are offered to Lakshmi, the Goddess of Wealth. Bengalis devote this day to Kali puja. The South has a different tradition.

BASANT PANCHAMI: Basant Panchami marks the first day of spring. In spring new leaves appear, the bud blossoms and all living things come to fruition. This exuberance in the world around and in the hearts of men is celebrated in a fitting manner. Everyone wears yellow. Men tie yellow turbans and women don yellow dupattas or saris. Children fly yellow kites. It was on this day, according to legend, that Siva reduced Kamdeva, the God of Love, to ashes with one glance from his omnipotent third eye. Bengalis, who worship Saraswati, the Goddess of learning, on this day, take out an image of the goddess in procession and immerse it in the river.

RAKSHABANDHAN: Rakshabandhan, or Rakhi, commemorates the occasion when Sachi, the wife of Indra, tied a sacred thread round her husband's wrist after he had been defeated by the 'asuras' (demons). This amulet gave him added strength and power so that he returned to the fight and triumphed. On this day, a sister ties an amulet of coloured thread round her brother's wrist while reciting 'mantras' (prayers). The sister then presents the brother with sweets. He reciprocates by giving her a present in cash. The amulet is supposed to give the wearer strength to ward off evil influences. In the ceremony of Rakshabandhan, the sister symbolically places her honour in her brother's keeping and he in turn pledges to protect her.

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DUSSERAH: The Dusserah celebrations take different forms in different parts of the country. In North India, episodes from the Ramayana are staged for a few nights preceding Dusserah. Each quarter of the city erects its own make-shift stage, while local residents make up the cast. On the evening of Dusserah a big fair is held and large effigies of the demon king Ravana and his minions are burnt amidst great jubilation.

Dusserah in South India is a nine-day festival, during which every house is decorated with tiers of little clay dolls representing various divine and lay figures. In the evening visits are exchanged and everyone keeps open house. On the ninth day, puja is offered to the Goddess Saraswati. The worship of tools and implements for different occupations forms part of the ritual. Mysore is famed for its Dusserah festivities. In Bengal, this festival is called Durga Puja. It is spread over four days, at the end of which an image of the Goddess Durga, seated on a lion and flanked by the Gods Kartik and Ganesh, sons of Siva, is taken out in procession and immersed in the river. This ceremony symbolizes the home-coming of Parvati (Siva's consort) and her subsequent return to her Lord. Durga Puja is the most popular festival in Bengal.

HOLI: Holi, which comes in March, is in celebration of the death of the ogress Holika at the hands of Lord Krishna. It is an occasion for boisterous fun, marked by the squirting of coloured water. In the evening, folk-songs are sung at gatherings round huge bonfires.

KUMBH MELA: Besides, fasts and festivals, there are melas or religious fairs. Chief among these is the Maha Kumbh Mela, which is held at Hardwar, Allahabad, Ujjain and Nasik once every twelve years, usually in the months of March or May. Certain days during this mela are considered auspicious for bathing in the river. There is an interesting story about the origin of this festival. The devas (gods) kept the Nectar of Immortality in a vessel (kumbh) and the asuras (demons) fought hard for its possession. During the battle, the kumbh fell on the earth four times -- at Allahabad, Hardwar, Ujjain and Nasik. On the twelfth day of the fighting, Lord Vishnu intervened and brought peace by distributing the contents of the kumbh among the deserving. The mela is gigantic. Every devout Hindu who can afford it visits the holy place at this time. The period is devoted to bathing in the river, fasting, prayer and meditation. A unique feature of this mela is the famous procession of sanyasis (holy men). On this occasion they come out of their seclusion.

MAHAMAHAM: Somewhat similar to the Kumbh Mela of North India is the Mahamaham in the South. This is held at the sacred spot of Kumbakonam. There is a tank here popularly known as Amritavapi. Legend has it that during the third Pralaya (Deluge), the seeds for the next cycle of creation were preserved in the Amrita Kumbh. Under the direction of Yogi Kakabhusanda, the pot was closed and sealed with a string. When the deluge swamped the earth, this Amrita Kumbh floated upon the waters. As the flood subsided, the Kumbh touched the earth at Kumbakonam. It fell at an angle and the cord snapped; the lid fell off and the water flowed out to form the pool known as Amritavapi. Mahamaham is also a bathing fair and numberless pilgrims assemble at Kumbakonam to have the sacred dip.

MUSLIM FESTIVALS:

Muslim festivals, though fewer in number, are celebrated with much zest and enthusiasm. Id-i-Milad, Id-ul-Fitr, Id-ul-Zuha and Muharrem are the more important occasions.

Id-i-Milad is the Prophet's birthday and also the anniversary of his death, while Id-ul-Fitr marks the end of Ramzan, the month of fasting. Id-ul-Zuha commemorates the triumph of Hazrat Ibrahim, who was ready to sacrifice his son Ismail at the altar in response to the command of God. These three festivals are celebrated in a similar manner. New clothes are worn and food and sweets are distributed among the poor. Congregational prayers are offered in the mosques and Muslim divines deliver sermons on the life of Prophet at public and private gatherings.

Muharrem is another Muslim festival, but it is observed only by Shia Muslims. It is in memory of the martyrdom of Hazrat Hussain, a grandson of the Prophet. The Shias go into mourning for a period of ten days, at the end of which a symbolic funeral procession is held.

The Christian festivals are too well known to merit description. In India, they are celebrated with great zeal and non-Christians, too, join in the festivities.

LANGUAGE AND LITERATURE

The Indian Constitution recognizes 14 languages. Hindi, the language of nearly 42 per cent of the people, has been declared the State language, but for a period of 15 years from 1950 English will continue in official use.

ORIGIN & GROWTH: The Indian languages have been classified under four heads: (1) Indo-Aryan, (2) Dravidian, (3) Austric and (4) Sino-Tibetan. The Aryan languages are descended from the ancient speech of the Indo-European invaders who came to India from their original homeland in the Eurasian plains. The oldest form of Aryan speech is to be found in the Vedas, the four sacred books of the Hindus, which are believed to have been compiled c. 10th century B.C. Vedic Sanskrit gradually evolved into what are known as the middle Indo-Aryan dialects. Between 600 B.C. and 1000 A.D., the period of Aryan expansion, these dialects gradually spread over northern India. The early literature of Buddhism is enshrined in Pali. By the 10th century A.D., the middle Indo-Aryan dialects gradually developed into the modern Indo-Aryan languages.

The most important of these is Hindi and, on the basis of the numbers who speak it, it is the third most important language in the world after northern Chinese and English. The home districts of Hindi are eastern Punjab and Western Uttar Pradesh. It has also come to be accepted as the literary language of the neighbouring areas. Hindi is easily understood by people who speak other Aryan languages such as Bengali, Assamese, Oriya, Marathi and Nepali. It is thus the most representative language of modern India.

Though Delhi is reputed to have been the birth-place of Urdu, it is known that Persian-speaking soldiers settled down in the Punjab 200 years before the first Muslim Sultan ascended the throne of Delhi. They inter-married and spoke a variation of the local language, heavily interlarded with Persian. The invasions of Mahmud of Ghazni and Mohammed Ghori helped to establish Urdu in Delhi, and within a few years it passed into common speech. Urdu thus evolved as a result of Persian influence on Hindi and came to be written in Persian characters. It became current in north-western and upper Gangetic India and later in the Deccan.

The Dravidian languages, spoken by 20 per cent of the people, have their home in peninsular India. Tamil, Malayalam, Telugu and Kannada are the most important of them. Tamil, the oldest member of the group, preserves a good deal of the general character and vocabulary of the ancient Dravidian speech; it has a most extensive vocabulary. Malayalam is closely related to Tamil but has borrowed considerably from Sanskrit.

Primitive tribes, constituting 1.3 per cent of the population and living in the forest areas of Bengal and Bihar, speak dialects of their own and, till recently, they did not even have a script. These languages are said to be related to those of south-east Asia. Along with the latter they are described as Austro-Asiatic languages. They are believed to have come to India from the north-east long before the Indo-Aryan invasion.

Sino-Tibetan dialects are spoken by small tribes along the southern slopes of the Himalayas and in north Bengal and Assam. Nawari of Nepal and Meithei or Manipuri of Manipur are the most important. These tribes are now learning Bengali or Assamese and are rapidly becoming bilingual. They constitute 0.35 per cent of the population. In spite of this variety of languages and dialects in India there is a basic unity underlying them. They bear the influence of a commonly shared culture.

LITERATURE: Among the Indo-Aryan languages, the Vedas are the most ancient collection of hymns and religious writings. They consist of four books, the earliest, the Rig Veda, being older than the Homeric poems.

By about 600 B.C., the old Indo-Aryan language of the Vedas had metamorphosed into Prakrit (as it later came to be known) just as Latin changed to Italian. The Brahman priests continued the study of the old Vedic language and developed a younger form of Vedic speech known as Sanskrit. It soon became the language of the sophisticated, and even if it is not spoken today it has been in use ever since for religious purposes. The two great epics of ancient India, the Mahabharata and the Ramayana, which assumed their present form about the time of Christ, were written in Sanskrit, as were the Puranas -- books on religious and historical traditions. Meanwhile, certain heterodox systems of philosophy were founded by Mahavira (Jainism) and the Buddha. Their followers produced a great mass of literature in Pali and various other dialects. To these must be added the older literature of Tamil whose earliest specimens date back to the beginning of the Christian era. In Tamil, beautiful poetry was composed under a different inspiration -- that of the ancient Dravidian culture. From the 10th century onwards, Telugu, Kannada and Malayalam developed rapidly and much valuable writing was done in each of them. Modern Indian literature may be said to have begun with the emergence of the new Indo-Aryan and Dravidian languages of the South after the 1st century A.D.

HINDI: The epics and ballads of Rajasthan detailing the exploits of Hindu kings against the Muslim invaders constitute the beginnings of Hindi literature. The great work Prithviraj Raso, written by Chand Bardai, is a landmark in Hindi literature. This was followed by a revival of Vaishnavism and the literature of the period was characterized by an intense extrovert devotion to an omnipotent god who, from time to time, assumed human form to cleanse the world of evil. To this Bhakti (devotion) movement, as it is called, belong the saintly poets Kabir, Mirabai, Surdas and Tulsi Das. Between the 16th and 17th centuries, Tulsi Das rewrote the Ramayana in the old Awadhi form of eastern Hindi. In Rajasthan, Mirabai sang the praise of God in ecstatic terms and her rhythm and devotion swayed millions of hearts. Between the 17th and 19th centuries, some of the best lyric poetry was written in Hindi, but towards the end there was a decline in its quality. With the advent of printing and English education, Hindi received a fillip and Hindi prose has since developed rapidly. There are a number of writers experimenting with all literary forms.

BENGALI & ASSAMESE: Chandidasa was a great Bengali poet of the 14th centuries. He wrote some fine lyric poetry. A biography of Chaitanya, a Vaishnava religious reformer, by Krishnadasa Kaviraja is an outstanding work in Bengali prose. Narrative tales of heroism and devotion and romantic

ballads occupied a prominent place in Bengali. Bankim Chandra Chatterji, novelist and essayist, is considered the greatest writer of modern Bengali literature before Rabindranath Tagore. Ishwarchandra Vidyasagar became a household name in Bengal in the 19th century and at about the same time Michael Madhusudan Dutt wrote English and Bengali poetry of considerable merit. In 1913, Tagore won the Nobel Prize for Literature. It is to Tagore mostly that modern Bengali is indebted. A standard Bengali is used for prose throughout the province and Bengali has probably been more susceptible to Western influences than any other Indian language. Standard Bengali translations of Shaw, Eliot and Ezra Pound are popular. Assamese has a devotional literature of rare quality in the writings of Sankaradev and other writers of the 15th and 16th centuries. A striking feature of Assamese literature is the series of prose chronicles known as Buranjis. These are imitations of the chronicles of the Ahoms, who had affinities with the Siamese and conquered Assam in 1228. They ruled over the province for six centuries and were subsequently absorbed in the local populations.

WESTERN INDIA: In the Maratha country, Dnyana Deva wrote a commentary on the Bhagavad Gita, a philosophic discourse contained in the epic Mahabharata. He was followed by a succession of saintly poets and reformers, of whom the most popular was Tukaram. The ballads or powadas of Maharashtra narrate episodes from Maratha history. The foundations of modern Marathi prose were laid by the earlier essayists, writing chiefly on social and political reforms. Chiplunkar, Agarkar, Ranade and Tilak were among the important writers. Hari Narain Apte developed a sense of social awareness through the novel. Mahatma Gandhi and K. M. Munshi have made significant contributions to modern Gujarati literature and journalism in recent times.

SOUTH INDIA: Under the patronage of the powerful rulers of the Vijayanagar Empire, some poetry of value was written in Telugu. Ballads, historical narratives and didactic poetry constituted the bulk of Telugu literature during this period. In modern Telugu, Soundaranandam, is acknowledged to be a very fine piece of poetry. The Telugu poet Venkata Sastri has several works to his credit. Modern Malayalam draws its inspiration from classical Sanskrit and European sources. Vallathol's poetry is characterized by a very sensitive social conscience. In the 12th century, the Ramayana was translated into Tamil by Kambar. This book is an outstanding work. The advent of English, though it temporarily diverted attention from Tamil, has on the whole had a very salutary influence. The poet Bharati was the leader of the revivalist movement. Since his time, Tamil literature has made rapid progress. Bendra and Puttappa are two well-known names in contemporary Kannada literature. The modern Kannada novel deals predominantly with social problems.

URDU: When the Khilji rulers of Delhi invaded the Deccan in the first half of the 14th century, Urdu was transplanted to fertile soil. It was from the Telugu and Kannada-speaking areas that Urdu literature first received distinctive contributions. The king of Golconda, Mohammed Quli Qutub Shah (1580-1611) was a talented poet from the South. Wali, another poet belonging to the Moghul period, was the greatest of them all. In the meanwhile, Urdu was spreading from Delhi and there grew up a refined class of courtiers well versed in polite letters. The best Urdu prose was written by the "Fort-William" writers. Towards the end of the 19th century Ratan Nath Sarshar wrote his famous novel Fasm-i-Azad. While Hali and Mohd. Hussain Azad were the first of the moderns. Iqbal is undoubtedly read very widely. Prem Chand is famous for his short stories in Urdu. Among living poets Jigar & Firaq are probably the most outstanding.

INDIAN HANDICRAFTS

Indian handicrafts have thrived for centuries not as an organised and commercialised industry but as an unhampered expression on the part of Indian craftsmen to fulfil the daily needs as well as the inner aesthetic urges of the community. And these craftsmen were, and are even now, part of an integrated pattern of life serving the community's essential needs and responding to the same joys and sorrows, living by faith in the same myths, religion and folklore. They recreated and revitalized it on the walls of their homes, or in the intricate carvings on the articles for their daily use.

Created primarily to answer the requirements of the people handicrafts soon became an expression of their creative talents. Men and women in the remote villages had an opportunity to give expression to their creative urges. The women of Punjab sang jaunting melodies as they embroidered their hearts' desire and longings, expressing their emotions through colourful threads and motifs. The Bihar peasant woman, in her spare time created the proud form of the peacock, the human figure or an elephant, out of the humble "Bikki" grass, so as to present it to her daughter in her dowry, as this was her only means of rivaling the dowry of the Zamindar's daughter. And the humbler Kota tribal men whittling a stick, carved with an ordinary pen knife, the head of the local deity during his spare time. On the other hand, the crafts in the larger towns, which sprang up round the temples and the courts of the kings, came into being to answer the requirements of wealthy patrons.

Thus our handicrafts showed two distinct developments, the growth of the crafts in rural areas, where they retain their original primitive, simplified patterns and the urban craftsmanship which was highly perfected and stylized.

The artisan was an important factor in the Indian society and culture. He performed a valued and fruitful social function, and thus earned for himself a responsible position in the social structure and a status in return for services rendered to the community. He worked for those whom he knew and this gave a touch of personal intimacy to his work. The things prepared by him were for the use of the people around him and not for sale in distant market place. His work was not valued in terms of money but gave him a right to expect from his village community the necessities of life. He was an heir to the folk traditions passed on to him by his forefathers and perfected by accumulated experience. He was neither at the mercy of the middlemen nor the changing tastes and vagaries of a fluctuating clientele.

He wove the traditional lore into his craft and made it into an art. The local styles which these craftsmen evolved were also a great contribution to the evolution of Indian Art, adding to the wealth and variety of colour and designs.

This, however, has changed in the past half century. In the economic struggle, the new rising society, handicrafts were partially lost to us. In fact, the production brought to the forefront a new type of product, which though fulfilling the basic need, was of a uniform type and design. The personal touch and creative talent which went into the preparation of each article was lost, and articles made for specifically commercial purposes unknown customers were produced. Thus that basic quality which set the handicrafts apart from the machine made goods was lost.

After Independence there was a renaissance of the Indian handicrafts. Handicrafts which had been neglected for so many years came to be regarded as representing the cultural ethos of the nation, and thus occupied an important place in Indian homes. The industry today also enjoys a prominent place in the National Economy because of its employment potential. Over a million craftsmen are estimated to be employed in this activity, and the estimated figures of the production are placed at over Rs. 100 crores. The Government of India set up the All India Handicrafts Board in 1953 with the object of encouraging the development of handicrafts on all sides. It has since then made a study of the problems of the handicrafts industry as well as taken specific measures for their development.

Besides providing finances to the State Governments for the development of crafts, the All India Handicrafts Board has given assistance in overcoming various difficulties of the craftsmen experienced in different states. The All India Handicrafts Board has set up development centres to deal with specific problems of each craft. In many areas certain crafts which had become almost extinct have been revived by the All India Handicrafts Board through its development centres. One of the most important activities of the Board is the development and the revival of the traditional designs in the handicrafts industry. The problems faced today in the question of designs are numerous.

The revitalization of traditional designs which have become decadent, as the significance of their designs has been completely lost, and they have become divorced from current requirements. The re-designing of certain articles, the functions of which have changed with the present day changes in everyday life. Instructions to the craftsmen in designs as their traditional school of apprenticeship to the master-craftsmen for the training of the artisans has been completely lost.

The Designs development has been accorded special attention and four Designs Centres have been set up in different regions in India for answering the above problems. The opening of Emporia for the sale of handicrafts, to make them available to all classes of people has also helped in reviving the crafts by creating a demand for them. The craftsman who had, inspite of all the odds, remained faithful to his craft, is now coming into his own again. The recognition due to him is once again there.

A BRIEF OUTLINE OF DELHI, PAST & PRESENT

by

Shri Mohd. Ashraf Husain

Delhi rightly regarded as the Indian Rome, the Seven Hills of Rome being represented by the Seven Cities of Delhi. The main difference is that the Roman hills having been built over are now hardly distinguishable but the remnants and monuments of the Seven Cities of Delhi, scattered over an area of about 12 miles long by 6 miles wide, are still traceable.

Delhi is of sufficient antiquity but its ancient history is rather obscure. Tradition avers that it dates back to the Mahabharata period and that the Purana Qila occupies the site of Indraparastha which was abandoned by the Pandavas because one day King Yudhisthra removed the cover of the dish and finding a fly on the food took the impertinence of the insect to be the sign of the departure of his royal glory. But there is nothing beyond tradition to establish this.

FIRST CITY: History, however, tells us that it was a well populated place in the 11th century A.D. and that Raja Anang Pal of Kanauj thought of making it his capital after he was defeated and driven out of Kanauj by Sultan Mahmud of Ghazna. The Raja built a fort, called Lal Kot, of rubble stone defended by a deep wide ditch and his successors ruled there almost undisturbed for about a century when, according to a pillar inscription, Visal Deva, a powerful Chauhan Rajput raja of Ajmer, conquered Delhi. He was probably the grandfather of Rai Pithora, better known as Maharaja Prithvi Raj, who built in his capital a big rectangular fort enclosing therein the Lal Kot of Anang Pal, in the centre of which now stands the Qutab Minar.

SECOND CITY: Towards the close of the 12th century A.D. the Mohammedan Invader, Shihabud-Din Muhammad Ghori, defeated Maharaja Prithvi Raj and occupied Delhi. The fort of Rai Pithora was made the capital of the empire and it remained as such until the close of the 13th century, the chief monuments of the period being the Qutab Minar, the Quwwatu'l-Islam Mosque, Sultan Ghori's tomb, tomb of Altamish, etc., But Jalalu'd-Din, the founder of the Khalji dynasty (1290-95), transferred his seat to Kilokhri (near Humayun's tomb) which, on account of his murder, could not assume the proportions of a full-fledged capital. When a great horde of the Mongols invaded Delhi in 1303 'Alau'd-Din Khalji (1295-1315), the nephew and successor of Jalalu'd-Din Khalji, had to entrench his army against them at Siri and on their retirement constructed there his own city. Chief monuments of the Khalji period in Delhi are the extensions of the Quwwatu'l-Islam Mosque, the 'Alai Darwaza, the unfinished Minar originally designed to double the proportions of the Qutab Minar, the Jami Masjid of Hazrat Nizamud-Din Auliya, etc., and the most prominent characteristics of the refined Khalji architecture are its profuse ornamentation and exuberance and decorative squinches which were subsequently replaced by plain pendentives under the Tughlaqs.

/Continued 2.

THIRD CITY: During the Tughlaq period (1320-1412) three cities were founded. Thus in chronological sequence the Third City of Delhi was "Tughlaqabad" built by Ghayasu'd-Din Tughlaq in 4 years (1320-24) round a rocky hill, but it was soon deserted due to the scarcity of water.

FOURTH CITY: Since the large population residing on the open plain between Old Delhi (or the Delhi of Prithivi Raj and the Turk or Slave Kings) and Siri had been in an insecure position, Sultan Muhammad-bin-Tughlaq (1324-51) considered it expedient to construct walls to link up both the cities noted above on either side, and thus the Fourth City of Delhi, called Jahanpanah came into being. It was deserted when Muhammad bin Tughlaq transferred his capital to Deogiri in the Deccan and repopled it when shortly afterwards he realized his mistake and decided to come back to Delhi.

FIFTH CITY: His successor Firuz Shah Tughlaq (1351-88) founded a new city, named after him "Firozabad", 4 or 5 miles to the northeast of Siri in 1354. It covered a portion of Shahjahan's Delhi and extended up to the Ridge to the north. Chief monuments of the Tughlaq period in Delhi are Tughlaqabad, the Tughlaq's fort, the tombs of Tughlaq Shah, Muhammad Shah and Firuz Shah, the two Kalan Masjids, Khirki and Begumpuri mosques, etc., and the outstanding features of the Tughlaq style of building are the walls with a decided batter, strength and severity of the exterior and complete absence of ornamentation and exuberance displayed in the Khalji buildings.

SIXTH CITY: After the Mughal conquest, Emperor Humayun (1530-39 and 1555-56) erected the Purana Qila in 1533-34 on the site believed to represent the ancient city of Indraprastha, the famous city of Yudhisthra, and rebuilt Indrapat renaming it "Din-panah". But in 1539 he was driven out of India by Sher Shah Sur (1539-45) who built, on the joint sites of Indrapat and Firozabad, the boundary walls which were completed after his death by his son Islam Shah Sur (1545-52). Sher Shah strengthened the citadel of Din-panah and built therein a beautiful mosque and a Mandal, which latter was subsequently used as the library of Humayun from the top of which he accidentally fell down and lost his life in 1556. The best specimens of the Afghan style are seen in the Lodi tombs at Khairpur, the Moth-ki-Masjid and the Purana Qila mosque.

SEVENTH CITY: The seventh and last city of Delhi was built between the years 1638 and 1649 by the Mughul emperor Shahjahan (1627-58) after whom it was named as "Shahjahanabad". For the sake of convenient study, the Mughul architecture is divided into three periods, viz., (a) the Early Mughul style confined to the reigns of Babur, Humayun, Akabar and Jahangir (1526-1627), the Middle Mughul or Shahjahan's style including the work of Aurangzeb (1627-1707), and the Late Mughul style (1707-1857). The most important local examples of the Early Mughul style are the tombs of Humayun and Itga Khan; of the Middle Mughul style, the Delhi Fort with its palaces, the Jama Masjid the Fotehmuri Masjid, the Moti Masjid and the Zinat-ul-Masjid and of

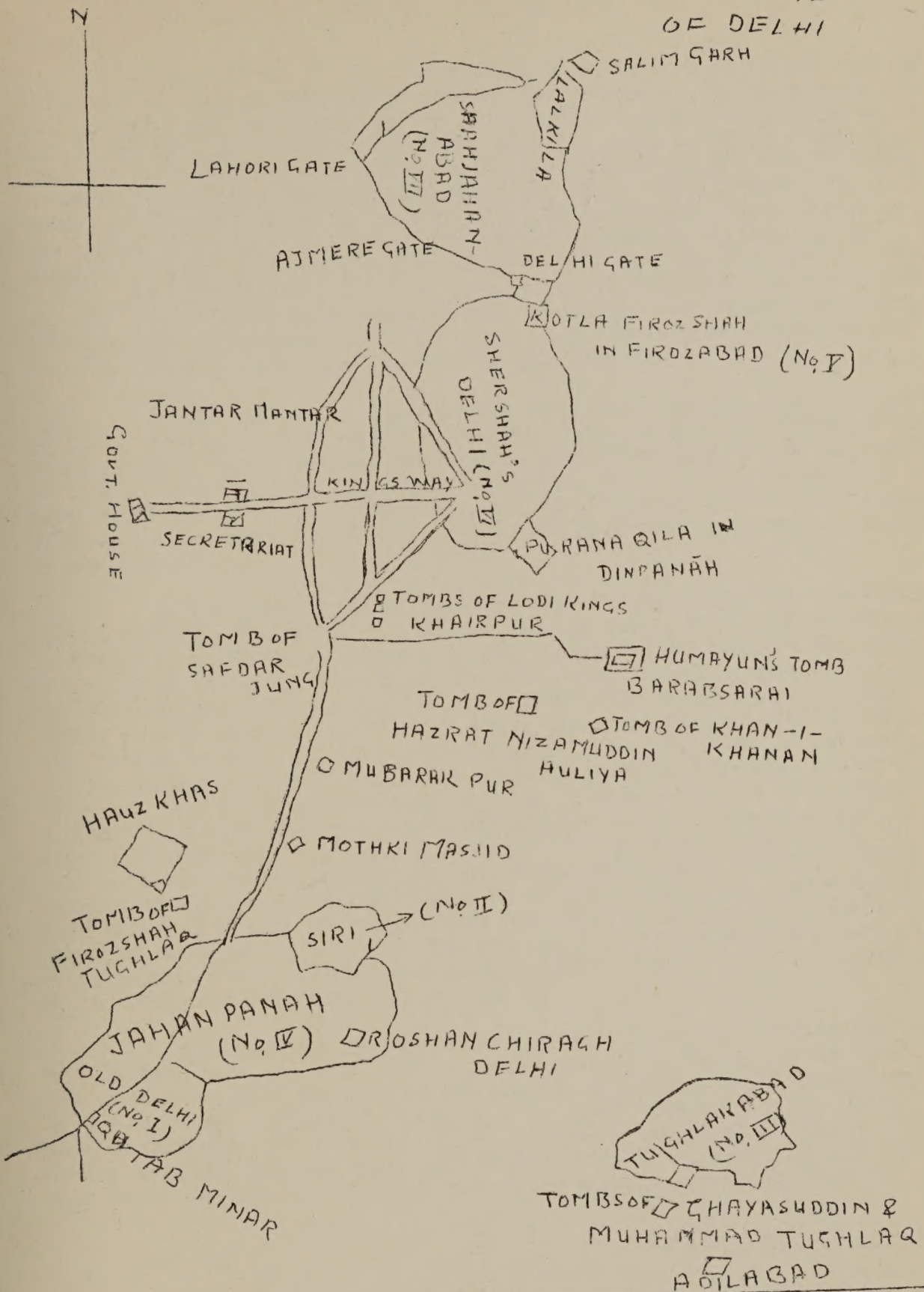
the Mughul type, the tomb of Safdarjang, the three Sunahri Masjids, and the Moti Masjid at Mehrauli. Briefly speaking, the Early Mughul buildings are robust and exuberant, the Middle Mughul ones (excepting some of Aurangzeb's) perfect in proportion, elegant and effeminate, and the late Mughul ones lacking the suavity of form, the graceful play of surface and, above all, the aesthetic sense of proportion. Some of the distinctive features of Shahjahan style, which was the climax of the art, are his multifoil and engrailed arches his high-drummed bulbous domes constricted at the neck, his pillars with foliated bases, tapering shafts and voluted capitals, and his double columns.

During the British rule (1857-1947) Calcutta enjoyed the honour of being the capital of the Indian Empire until 1911 when the important announcement of transfer of the seat of Government to Delhi was made at the Great Durbar held on December 12, 1911. Shortly afterwards the lay-out of the new capital, now known as "New Delhi", was taken in hand and the Raisina mound selected for Government House and twin three-storied secretariats.

The two secretariat building, were designed by Sir Herbert Baker and the Government House, now known as Rashtrapati Bhavan, was designed by Sir Edwin Lutyens. The form of architectural expression used throughout is Palladian classic, but both architects have introduced Indian features such as the Chhajja (or projecting eaves) to keep walls cool, the Chhatra or Umbrella-shaped roof- Indian symbol of royalty), the Jalis or pierced stone grilles. Sir Edwin Lutyens, however, in the Government House, has deliberately gone further than Sir Herbert Baker in the secretariat buildings in trying to marry the spirit of Indian architecture, both Hindu and Mohammadan, to that of English and Italian classic.

It may be pointed out that the names of "Old Delhi" and "New Delhi" are by no means modern. During the reign of Firuz Shah Tughlaq, the name of "Old Delhi" was applied to the whole plot of land from Tughlaqabad to Jahanpanah, including "Alau'd-Din's Siri and Muhammad Tughlaq's Jahanpanah; whereas in the Siri period (1539-55), Sher Shah's Delhi including the Din-panah of Humayun, was called "New Delhi" and the cities clustering round the Qutab Minar were known as "Old Delhi".

SKETCH SITE PLAN OF THE SEVEN CITIES OF DELHI



Into a Village of North India

Your introduction to the village is quite sure to be the cows and buffaloes of village families grazing by the roadside. The youngsters and old men and women who herd them sit under a tree near by, resting or gossiping. You may also meet the shepherd, with his goats crowding around him feasting on the leaves and twigs that he is chopping from a tree intended to shade travellers. Further from the road, you see the farmers with their teams of bullocks, ploughing or irrigating their fields. These fields are the centre of village attention. The crops now growing on them are the promise of food, not only for the families which own them but for the whole village. At harvest time, if there is plenty, all will share in the bounty and eat well. If untimely rains or hail or drought have damaged the grain, all will have to be satisfied with little; and some may be obliged to borrow grain or money to tide them over to the next harvest.

To the villagers, their fields represent more than the production of food. They are an essential part of the life and the continuity of the families which have inherited them. Even though the land of any one family is divided into small plots, widely separated, it is their heritage from the past, their security for the present, and their provision for future generations. The low earth boundaries around each plot must be preserved, intact at any cost.

At the edge of the village you find the dhobi standing knee deep in the village pond, swishing a garment in the water, then whacking it down on his rock, to knock out the dirt. And inside the village are the carpenters and an ironsmith working in the lane outside their homes; the barber squatting in a shady spot shaving a neighbour; the tailor busy at a hand-turned sewing machine, on his front step; the grain-parcher sitting beside his flaming furnace, stirring maize or gram in an iron basin of hot sand; and the potter squatting beside his large flat wheel, twirling it with a stick and then shaping water jars on it as it spins. If you look inside the goldsmith's small front room, you will see him blowing through a long slender brass pipe into a flame, melting a piece of silver; or if you look in on the cotton-carder, you see him tapping his long carding bow, whipping tightly packed wads of cotton from the pile on the floor before him, and sending them flying high into the air, fluffy and white as snow-flakes. And if there is an oilsmith, you will find him inside his courtyard or a dark inner room, prodding his small blind-folded bullock round and round the creaking press, while the oil drips into a clay jar.

If you ask any of the farmers or any one of the artisans how long he has lived here, he will look at you in surprise. He has always lived here. This has been the home of his family, generation after generation. As for his work, he began it as soon as he could hold a δ tool or drive a pair of bullocks. At first he helped his father and elder brothers, gradually assuming more and more responsibility until the time came for him to take over. He may have attended school for a while, or he may have run

away to the city to try a different kind of life. Neither experience seems important now that he has taken his place in the family and the community. He uses the tools which his father used, or others like them. His social position in the village, along with his work, has been determined by his caste. And, be this high or low, he neither questions nor resents it. He accepts the good harvests or bad, plenty or want, health or illness. He is aware that in the cities there is rapid progress, and in his area there may be a development programme. The former does not stir him. And his interest in the latter depends on how far it has brought benefits to his fields, his craft or his family. In his conversation he seldom, if ever, speaks of himself as an individual. He is a member of a family whose prosperity is his chief concern.

Although all members of any one household are closely united in their common interest - the welfare of the family - there is a clear division within the family, between the lives of the men, and of the women and children. Their paths seldom meet. While the men and older boys carry on their occupations and find their companionship in fields and lanes among other men the women and children confine their activities and interests to the family courtyard. Here they have a well defined organization of their own. The wife of the oldest man of the family is ordinarily accepted as head of the courtyard colony. The younger women perform the household chores assigned by her, without audible complaint. Sometimes a daughter-in-law becomes truculent, and quarrels ensue. Such quarrels may lead to the setting up of a separate hearth, indicating a break in the joint family. The new hearth, in a corner of the courtyard apart from the family hearth, may remain for only a few weeks, when peace is restored. Or it may lead to a cleavage in the family, with consequent division of property.

Occasionally a grown daughter of the family is at home for a visit. With this exception, all of the married women inside the courtyard have come as strangers from other villages. Each one was brought as a bride, after the final wedding ceremonies in her home village. Some girls make the adjustment to life among in-laws slowly. Others readily accept the new environment. Eventually, each woman becomes a part of her husband's family and has no interests beyond the courtyard walls.

Materially, life is still simple. Village men and women have learned that life can be satisfactory with minimums. Every article in the courtyard or adjoining rooms, is there because it has a definite function. To go beyond this, to include articles intended for comfort, or worse still those counted as luxuries, would seem reckless waste. Their one indulgence is rich food, and that, only at the time of festivals.

The social life of the village appears complicated to an outsider. Although an individual is always under the wing of his family, his behaviour is governed and judged by seemingly countless rules - rules regarding his relations with those of other castes, with members of his own caste and with in his own family. Always there seems to be someone above him to whom he

must offer respect and always some one beneath him from whom he must demand respect. However, the rules have been established for so many generations and have become so fixed that every boy and girl is familiar with them before venturing beyond the relationships of the immediate family.

It may help us to understand the reactions of village men and women better if we realize that Utility is a major factor in determining the value set on any article; and Security is a major factor, not only in controlling relationships, but in the assessing of any new idea, be it concerned with village development, farm practices or social institutions.

HINDUISM IN EVERYDAY LIFE

Our aim here is to show how an average Hindu thinks, what he believes in, and how he worships.

Hinduism has perhaps the largest Pantheon of all the religions. There are as many gods and goddesses in number as there are people in India; but the cardinal point to note is that behind this multiplicity, the belief is in One Divinity. The one divine may be worshipped in any one of its forms, according to the aptitude of each individual; the aptitude being determined by the temperament of the individual. According to the theory of Rebirth, an individual can improve his successive lives through good actions. The temperament of the individual will therefore be determined by where he is in the cycle of evolution, and what is his level of understanding.

The Hindu pantheon is presided over by a Trinity which is as follows:

1. The Lord Brahma -- the creative force of the Divine,
2. The Lord Vishnu -- the preserving force of the Divine,
- and 3. The Lord Shiva -- the districtive force of the Divine.

Brahma as such is not worshipped widely. Vishnu is commonly worshipped in the form of two Incarnations:

- (i) Rama, on whose life is based the great epic "Ramayan".
- (ii) Krishna, on whose life is based the other great epic "Mahabharata".

Another deity that is extensively worshipped, specially in the Eastern part of India, is Shakti, which literally means Energy. It is the female aspect of the Divine force. The above are the four main deities of worship. Thus Hinduism does not involve belief in any definite conception of God, revealed by one definite scripture and one alone, and declared by a particular prophet only. The worshipper of one deity will also worship the others. There is no narrowness in this sense. In one and the same temple many deities are installed.

The chief mode of worship in India is temple worship. Even small villages have a shrine of some sort. In many houses there will be an alcove or a corner for worship, with some of the deities installed there. The mode of worship consists in recitation from the scriptures; prayers; meditation; offerings of rice, water, flowers etc.; burning of incense. Each of these observances has a definite significance. Moreover the absolute and the relative significance of these observances changes with the level of spiritual attainment. There is a great tradition of the recitation of epics and the Upanishads before gatherings of people. There is also the tradition of Kirtan, which is the collective singing of hymns. A large number of days in the year are devoted to fasting. There are weekly, monthly and seasonal fasts and fasts associated with the gods and goddesses. The different fasts involve different disciplines regarding food and worship and other observances. A large number of centres of pilgrimage which are considered holy places for various reasons, are spread all over the country. They are alongside rivers,

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at ports, and in the mountains, and it is desire of every Hindu to visit at least some of them in his lifetime. The more important of these centres are visited by a large number of people every year, specially on accepted auspicious days. On these days people bathe in the holy rivers, make offerings and worship. This distribution of the pilgrim centres in the north, east, west and south of the country ensured the continuity of the religious and cultural traditions. People from all parts of India travelled all over the country.

Hinduism seeks to give satisfaction to all levels of intellect, all types of temperaments and to people of different cultural backgrounds. The primitive mind can fix itself only on a God with form and the deities are designed for his satisfaction. The intellectual on the other hand will meditate on the abstract and formless God. Even the artistic is given scope to worship through dance and music. Classical dance and music in India grew up in the temples of India. Even today, they are dedicated to the Divine. The end and purpose of life as understood in Hinduism is to attain the freedom of the spirit from the bondage of the body. This is to be attained by any of the three ways:

1. Karma Yoga, 2. Rajya Yoga and 3. Bhakti Yoga.

In every case however, living a morally pure life and doing one's duty with detachment is emphasized. There is a well defined code of Ethics accepted by Hinduism. According to it, there are five cardinal sins, five mighty demons to be conquered. These are: (i) Lust, (ii) Anger, (iii) Greed, (iv) Attachment and (v) Aggressiveness. The theory of Karma (the Law of Action) lays down that good actions produce good results and vice versa. Related to the theory of Karma is the belief in the transmigration of the Soul, and re-birth. According to one's actions, one is born better or worse in the next life. In each life man must improve himself morally and spiritually, so that the next life is better than this one. The greatest importance is attached to doing one's duty with detachment i.e. doing one's duty without getting enmeshed in the reward of the work.

The span of human life is divided into four stages (the four Ashrams of life): (i) Brahmacharya - studentship, upto the age of twenty-five. (ii) Grihastha- householder, upto the age of fifty. (iii) Vanaprastha - partial renunciation with devotion to social service etc. (iv) Sanyas - complete detachment from all worldly matters, including one's family. Renunciation to meditate on God.

Man must first immerse himself in this world and get to know its' temporariness, illusionaryness, hollowness through personal experience and realisation. Only after he has had personal realisation of the nature of the world can it be possible for him to renounce it and turn to meditation to discover Eternal truth. Every soul is a part of the Divine force and must ultimately come to it. It is Ego and Ignorance of the true meaning of reality that keep the two apart. It is believed that the emphasis on renunciation came to Hinduism from Buddhism. In the wide Tradition the Hindus believed in full blooded living. We must always remember that all the fasts, observances and rituals have the one aim of disciplining the emotions, the body and consequently the mind. Once this is achieved, the mind becomes like a calm lake, unruffled and peaceful. Meditation is inward and looks deeper and deeper within when the mind is calm, meditation will reveal its hidden depths.

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HINDI LESSONS

THE DELHI SCHOOL OF ECONOMICS
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A few words and phrases which are popularly used

Namastē, Namashkār, Sat Sri Akāl, Jai Rām Jī Kī	---	(my) greetings to you; I greet you. (Stands for English 'Good morning' 'Good afternoon', 'Good evening' & 'Good night')
Dhanya vād, Shukriyā	---	Thanks or Thank you.
Āpki mīharbānī, Āpki kripā hai	---	It is your kindness; It is very kind of you.
Āp kaisē hai?	---	How are you?
Mai bahut achchhā hū	---	I am quite well.
Thik hai	---	Alright; O. K.; Well.
Bahut achchhā	---	Very good.
Jihā	---	Yes
Jinahi	---	No.
Andar āiye	---	Please come in.
Āpka nām kyā hai?	---	Your name please?
Maf kijiye	---	Please excuse me; Sorry (expressing regret)
Mujhē afsōs hai	---	I am sorry. (expressing sorrow).
Āp kahā rahtē hai?	---	Where do you live?
Moter rōkiyē	---	Please stop the car.
Baithiye	---	Please sit.
Koi bāt nahī	---	Dosen't matter.
Shabāsh	---	Well done.
Bas	---	That's all; stop.
Āp kyā chāhte hai?	---	What do you want?
Mai āp sē kab milū?	---	When should I see you ? When can I see you ?
Kyā mai andar āsaktā hū ?	---	May I come in ?

Ēk kap chāy lāo	---	Bring a cup of tea.
Motar dhīre chalāo	---	Drive the car slowly.
Motar tēz chalāo	---	Drive the car fast.
Mai āj khānā nahi khāunga	---	I will not take my meals today.
Mai āj dēr sē au ga	---	I will come late today.
Mai āj jaldi au ga	---	I will come early today.
Āj mausam achchhā hai	---	Today the weather is fine.
Merī tabiyat thik nahi hai	---	I am not feeling well.
Tum kyā kar rahē hō ?	---	What are you doing ?
Tum kahā jā rahe hō ?	---	Where are you going ?

Words with Hindi equivalents

Stay	---	Thaharnā; rahnā.	Kālā	---	Black.	Chāy (F)	---	Tea
Dog	---	Kuttā (M)	Jūtā (M)	---	Shoe.	Rahnā	---	Live
Bark	---	Bhoknā	Saf karnā	---	to clean.	Udēlnā	---	to pour
River	---	Nadi (F)	Khansēmā (M)	---	Cook	Bulānā	---	to call.
Cook	---	Pakēnā	Āg (F)	---	Fire	Nayā	---	New
Flower	---	Phūl (M)	Jalanā	---	Burn.			

Progressive Present Tense

I am bathing	--	Mai nahā-rahā hū. Mai nahā-rahī hū.	We are bathing	--	Ham nahā-rahē hai. Ham nahā-rahī hai.
You are bathing	--	Tum nahā-rahē hō. Ap nahā-rahē hō.	He is bathing	---	Wah nahā-rahā hai.
You are bathing	--	Tum nahā-rahī hō. Ap nahā-rahī hō.	She is bathing	--	Wah naha-rahī hai.
They are bathing	--	Wē nahā-rahē hai,	They are bathing	--	Wē nahā-rahī hai.

/Contd... 3.

The above sentences show that the suffix 'ing' is translated into Hindi as 'raha' in masculine and 'rahi' in feminine. From the sentences under the 'Progressive Present Tense' it is seen that 'a' ending of the verbs change into 'e' ending when the verb is plural.

Practice

He is going with me to a village. They are not coming with him.
Are you drinking tea with your brother. Where is she staying in Delhi?
The girls are not singing in your room. The dog is barking.

A few popular words

Live	--	Rehnā.	Afternoon	---	dōpahar bād.
See	--	dekhnā	One	---	ēk
Weep, cry	--	rōnā	Two	---	dō
Slowly	--	Dhīrē sē; dhīrē-dhīrē	Three	---	tīn
Quickly	--	jaldī sē; jaldī-jaldī	Four	---	chār
Fan	---	pankhā	Five	---	pāch
			Six	---	chhah; chhe.
Sheet	---	chadar	Seven	---	sāt
Sun	---	Sūraj; dhūp	Eight	---	āth
Moon	---	chandramā; chād	Nine	---	nau
Shirt	---	kamīz	Ten	---	das
Spoon	---	chammach; chamchā	Eleven	---	gyārah
Newspaper	---	akhbār	Twelve	---	bārah
Sunday	---	Itvār; ravivār	Monday	---	sōm vār
Tuesday	---	mangal vār	Wednesday	---	budh vār
Thursday	---	guru vār; brihaspati vār	Friday	---	shukra vār.
			Saturday	---	shani vār.

/Contd..... 4.

Morning	--- subah	Evening	--- sham	Night	--- rat
Noon	--- dopahar	Cup	--- pyala	Plate	--- plet
Table	--- rez	Chair	--- kursi	House	--- makan, ghar
Room	--- kamra	Verendah	--- varanda	Servant	--- nokar

Some popular proper nouns

President	---	Rashtrapati
President's House	---	Rashtrapati Bhavan
House of the People (Lower House)	---	Lok Sabha
Council of States (Upper House)	---	Rajya Sabha
Parliament	---	Sansad
Parliament House	---	Sansad Bhavan
Minister	---	Mantri
Prime Minister	---	Pradhan Mantri
Chief Minister	---	Mukhya Mantri
Legislative Assembly	---	Vidhan Sabha
Legislative Council	---	Vidhan Parishad

Names of Persons

Rajendra Prasād	Jawahar Lal Nehru	Rajkumari Amrit Kaur
Maulana Abul Kalam Azad	Chintamani Deshmukh	Shrimati Durgabai
Govind Bhallabh Pant	Kailash Nath Katju	Charu Chandra Biswas
Pattabhi Sitaramaiya	Shrimati Lilavati Munshi	B. N. Datar
K. C. Reddy	Shri Prakash	Hare Krishna Mahtab
Ravi Shankar Shukla	Chandra Shekhar	Anantashayanam Ayyangar
Ganesh Vasudev Mavalankar	Thekurdas Bhargava	Krishna Murti Rao

Mahatmā Gāndhī	Sardār Ballabh Bhāi Patēl	U. N. Dhēbar
Shriman Nārāyan	Subhāsh Chandra Bōse	Shrimatī Sarōjini Nāidū
Madan Mōhan Mālaviyā	Ravindra Nāth Tagōre	Maharshi Arvinda Ghōsh
Bāl Gangādhār Tilak	Maharshi Dayānand	Ramakrishnā Paramhansa
Swāmi Vivekānanda	Swāmi Ramtirtha	Chitanya Mahāprabhū
Shrimatī Kamalā Nēhru	Akbar	Maharānā Pratāp
Humāyūn Kabīr	Rādhākrishnan	Rājagōpālāchārī
Morārjī Dēsai	Ashra Ghōsh	Shankarāchāryā
Purushōttam Dās Tandon	Āchārya Vinōbā Bhāvē	Jaya Prakāsh Nārāyan
Āchārya Kripalānī	Shrimati Suchetā Kripalānī	Dr. Shushilā Nayar
Shrimati Kamalādēvi Chattōpādhyāy	Shrimati Rāmeshwarī Nēhrū	Bhagat Singh
Āchārya Narendra Dēv	Lāl Bahādur Shāstri	T. T. Krishnāmāchārī
Khandubhāi Dēsai	Panjāb Rāo Dēshmukh	Mehar Chand Khannā
Bāl Krishna Kēskar	Nityānand Kānungō	Shankar Pillai
Syed Kahmud (Saiyed)	Aruna Bōse	Manōhar Ray
Sharachandrā Chattōpā- dhyāy Chatterjee	Rabindrā Gangōly	Shyāmā Prasād Mukherjee
Vishwanāth Iyer	Anwar Iqbāl Qurēshī	Chakrapānī Shuklā
Khāliq Anjum	Morārjī Ranchhōdji Dēsi	Surendra Kumār Dēy
Vengalil Krishnan Krishnā Menon	Sadāshiv Kanōji Patil	Balkrishna Vishwanāth Kēskar
Dattātraya Pareshwaram Kēskar	Manbarlāl Mansukhpal Shāl	Anil Kumār Chandā
Ashok Kumar Sen	Kālū Rām Shrimāli	Abid Ali
Mollakapalli Venkat Ramangowdē Krishnappā	Jai Sukh Lāl Hathi	Bali Ram Bhagat
Mono Mohan Das	Shāh Nawāz Khān	Shrimati Violet Alvā

Mehdi Nawāz Jung	Bishnū Rām Mēdhī	Siddhināth Sarmā
Hariday Nārāin Chaodhrī	Sahdeo Mehtō	Sri Krishna Sinhā
Bhadurbhāi Patēl	Ghulām Mohammed Bakshī	Hāfiz Mohammed Ibrāhim
Kamalāpati Tripāthi	Vichitra Nārāin Sharmā	Jagmōhan Singh Nēgi
Jugal Kishōre	Sampurnānanda	Mōhan Lal Sukhādīā
Ātmā Rām Govind Khēr	Bishwanāth Singh Gautam	Gridhōri Lal D. Ōjhā

Name of Places

RAJASTHAN:

Jaipur - Capital	Bikānēr
Ajmēr	Udaipur
Būndī	Chitōrgarh
Kōtā	

MADHYA PRADESH:

Bhōpāl - Capital	Gwālīor	Shivpur
Ujjāin	Indōre	Jabbulpore Rāipur

ORISSA:

Cuttack - Capital	Bhawānīpatna	Sambalpura Puri
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BOMBAY:

Bombay - Capital	Jainnagar	Ahmadābād Barōdā
Jalgaon	Wardhā	Nāgpur
Poonā	Satrā	Aurangābād

ANDHRA PRADESH:

Hyderābād - Capital	Adlābād	Nizāmābād
Mahbūb Nagar	Kurnool	Chhitōr Guntur

MYSORE:

Banglore - Capital	Mysōre	Gulbarga
Rāichūr	Belgaum	

/Contd.... 7.

KERALA:

Trivandrum - Capital Trichūr Cālicut Kottayam

MADRAS:

Madras - Capital Villōre Madurai
Coimbatore Tanjōre Cotaomund

DELHI: Capital of India.

JAMMU & KASHMIR:

Srinager - Capital Gilgit Jammu

PUNJAB:

Chandigarh - Capital Simlā Amritsar Jullundur
Ludhiānā Ambālā Kapurthala Ferōzepur

UTTAR PRADESH:

Lucknow - Capital Allchābād Varānasi Āgrā
Fatēhpur Kānpur Dehrādun Aligarh

BIHAR:

Patnā - Capital Dhanbād Rānci
Hazāribāgh Bhāgalpur Dallonganj

WEST BENGAL:

Calcuttā - Capital Āsensol Bankurā Howrāha
Alipore Midnapore.

ASSAM:

Shellōng - Capital Gauhati Tēzpur Kohimā

MANIPUR: Imphāl - Capital.

TRIPURA: Agartala - Capital.

PLANNING IN INDIA

A note by Shri V. T. Krishnamachari,
Deputy Chairman, Planning Commission, India.

I. Introduction

In this note an attempt is made to set out, in broad outline, the salient features of the first and second Five-Year Plans.

It is necessary to stress at the outset three points of basic importance:-

Firstly, when we began work on the first Plan, we did not think of it as an isolated effort. It was meant to initiate a programme of planned expansion to meet the immediate needs and long-term aspirations of 360 million people. It was to be the beginning of a series of plans, the objective being the doubling of per-capita income, within as short a period as possible, through increased employment, higher productivity and the achievement, of the largest possible measure of social justice. The vicious circle of poverty, leading to a low rate of economic development which further accentuated the state of poverty had somehow to be cut through having broken the crust, as it were, the first plan had to lay the foundations on which future plans could rest and fuller economic and social development could be achieved.

Secondly, the first plan should not be thought of merely as a series of projects or programmes for the different sectors of the economy with specific financial allocations and targets. In the words of the Prime Minister, it is "much vaster"--- the mighty scene of a nation building itself, remaking itself; all of us working together to make a new India--- not abstractly for a nation, but for the 360 million people".

Over 70 percent of these millions live in the villages. At one time we talked of the "placid, pathetic contentment of the masses." This is no longer true. The depression of the thirties, the Second World War, the achievement of Independence, the general elections on the basis of adult suffrage, and the impact of world forces have brought about a dynamic situation, ever changing. There are everywhere new hopes and the longing for a new order of things and a determination to work for it. This urge had to be guided into constructive channels so that the best results could be achieved by the full utilization of the human and material resources of the country.

The first plan thus sought to embody the efforts of the nation to build up a new life for itself and to create a new pattern of society in which there would be a fuller and richer life for all. In under-developed countries like India, there can be no economic growth on a large scale without far-reaching social changes. The Constitution has laid down the pattern of society which India should strive to set up. The objective is a Welfare State and there is emphasis on a social order in which "justice, social, economic and political shall inform all institutions of national life". This objective has been recently elucidated and we are aiming at "a socialistic pattern of society".

Thirdly, in the first plan we tried to find out own particular solution to the problem of democratic planning and strike our own national balance between liberty and progress, central control and private initiative, national planning and local authority. The quality of planning, especially of democratic planning, depends upon the extent to which the individual citizen is able to grow through active participation in programmes. It is the aim that the people should make the plans, accept them as their own and put forth all the sacrifices necessary for their accomplishment. This is part of our way of life. India has to advance along its own lines, without undue dependence on the experience and social philosophy of other nations.

II. Details of the First Five-Year Plan

In framing the first Five-Year Plan we had the following aims in view. These were:

- a. to restore the economy which had run down as a result of the war, to resist the inflationary pressures that were prevalent, to build up the transport systems and to ease the food and raw materials position;
- b. to formulate and execute programs of development which would be substantial in themselves while laying the foundation for larger efforts in the coming years;
- c. to initiate measures of social justice on a wide scale, thus taking the first steps in the direction of pattern of society placed before the nation by the Constitution in Directives;
- d. to build up administrative and other organizations which would be equal to the large programmes of reconstruction to which the nation was committed.

The basic objective was to secure a balanced development in the different sectors of the economy- scientific agriculture, cottage and small-scale industries, large-scale consumer goods industries and capital goods industries - the over-riding consideration being the maximum welfare of the community as a whole.

The total expenditure contemplated for the five years stood at Rs.3,500 to Rs.3,600 crores - Rs.2,200 crores in the public sector and the rest in the private sector. On the whole it is estimated that there is a short-fall of about 10 percent in the public sector and that in the organized private sector, the anticipated expenditure has been incurred.

The allocation under the various heads in the public sector was as follows:

<u>FIRST PLAN</u>		
	Total Provision	Percent
1. Agriculture and community development	372	16
2. Irrigation and flood control	395	17
3. Power	266	11

4. Industries and minerals	179	7
5. Transport and communications	556	24
6. Social Services, Housing and Rehabilitation	547	23
7. Miscellaneous	41	2
T O T A L	2356	100

About 44 percent of the total expenditure was to be incurred on agricultural improvement, including the National Extension Movement, and on multipurpose and large, medium and minor irrigation and power projects. The importance attached to the rural sector is easily understood. About 23.5 percent was to be spent on the railway system, mainly in rehabilitating it. Industrial expansion had to rely largely on private initiative and resources. About 8 percent was to be spent on State Industries and the rest 23 percent on social services, including education, health, rehabilitation of displaced persons, etc.

The following table roughly shows the way in which the Plan in the public sector was expected to be financed and the way in which it was actually financed:-

	<u>Expected in the</u> <u>Plan</u> (in crores of Rupees)	<u>Estimated on figures</u> <u>now available</u> (in crores of Rupees)
Total expenditure in the Public Sector under the First Five-Year Plan	2,186	1,970
<u>Resources under various heads:</u>	1,286	1,242
A. Budgetary Resources	769	689
Receipts from current Revenues	599	573
Receipts from Railways	170	116
B. Other Sources:	517	553
Loans from the Public	115	201
Small savings and unfunded debt	270	304
Other debt heads	132	48
C. <u>Gap in Resources</u>	900	728
External Assistance	300	203
Deficit Financing	600	525

Including the private sector, the total investment rose from 5% of the national income in 1950-51 to 7% in 1955-56. The first Plan ends on the 31st March, 1956.

III. Assessment of the results of the First Five-Year Plan

The questions that arise, in an attempt to assess the measure of success achieved, may be formulated in the following terms:-

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Firstly; Have movements been initiated for enlisting the support of the people to the widest possible extent for the implementation of the Plan. And is the best leadership available in the country associated with them?

Secondly; Are the Governments, including therein the administration at all levels, being increasingly strengthened to meet the demands on them?

Thirdly; Has there been an appreciable advance in social justice? Has the Plan initiated the social changes needed to bring about the new pattern of society which is envisaged?

Fourthly; Have the targets of the First Five-Year Plan been achieved?

In what follows, I shall attempt answers to these questions as briefly as possible.

In answering the first question, I shall deal specially with rural India. Eighty percent of the people live in the villages: the rural problem, mainly that of agricultural production, is a pressing one; and organising five hundred thousand villages and two hundred and eighty million people in a great effort is, the most difficult human problem that ever faced a nation.

We seek a solution for this in the National Extension movement, with which is integrated the Community Projects. Its fundamental principles are:

- a. All aspects of rural life are inter-related and improvement should be attempted on all sides though special importance may be attached to individual programs like agricultural production, cooperation, cottage and small-scale industries, etc.
- b. The aim is to bring about a change in the mental outlook of the 70 million families living in the countryside, arouse enthusiasm in them for new knowledge and new ways of life, and fill them with a will to live a better life.
- c. The movement is a permanent one; it is the Welfare State in action in the 500,000 villages of India.
- d. The broad pattern of the organization has been worked out on the results of the experience obtained in the country, in projects organized under Gandhiji's leadership, Firda development schemes, Sarvodaya movement, Schemes in operation in States like Baroda etc. Each State is required and authorized to introduce changes which local conditions demand.
- e. The National Extension Movement is not merely an official organization; at every stage the best available leadership should be associated with the officials in working it.

The programme of activities placed before those engaged in the movement was as follows:-

- a. Every family should have a plan of improvement of its own - improved agriculture, cottage and small-scale industries, etc.; the necessary assistance should be given for the implementation of this Plan.
- b. The cooperative movement should be spread so that every family is represented on at least one cooperative society in its own right.
- c. Every family should make its own contribution in labour and/or money for works of permanent benefit to the community, and in this way the vast unutilised energy in the country-side should be harnessed for the benefit of the community.
- d. A well-organized women's and youth movement should be developed in all villages.

The movement is in operation in about 120,000 villages. It began only three years ago, and has been gradually expanded to serve about one-fourth of the rural population of the country. The progress achieved may be said to be encouraging. The contributions by the people in the shape of money and/or labour have exceeded the expenditure incurred by Governments on works, and agricultural improvements, the cooperative movement and other programmes are making headway.

As the Prime Minister has said, this is a revolutionary movement. It is expected to cover the whole of India by the end of the next Five-Year Plan. Training courses for the workers needed are being organized and in the First Five-Year Plan Rs. 5 crores were set apart for these. It would, of course, be incorrect to say that the movement has established itself successfully everywhere. But the summing up on the recent report of the programme Evaluation Organization brings out the position correctly:

"The experience gained hitherto proved that if the objectives are such as evoke general acceptance, if the participation and sacrifices are evenly and justly distributed and if disinterested and competent leadership is forthcoming, there are no limits to which people will willingly and almost devotedly stretch themselves in furtherance of a common cause."

For cottage, small-scale and other industries, special autonomous boards have been set up which have just commenced work. They have worked out elaborate programmes for which finances have been made available.

I now come to the question of the efficiency of Governments including the administration.

As part of the National Extension Movement, improvements have been suggested by the Planning Commission in State administration - Village, Taluk or Tahsil, District and State headquarters - to ~~the~~ village coordinated action. The progress made in introducing these has been reviewed in the report recently issued. Generally speaking, administrative arrangements are gaining in efficiency in most areas. This, of course, is a continuous process and there is much room for improvement.

State enterprises like the Sindri Factory, the Chittaranjan Works etc., are showing increasingly satisfactory results.

In the sphere of multipurpose and large and medium irrigation and power projects, there is marked improvement. In the years between the two wars, there were only two large irrigation projects in undivided India. Under the first Five-Year Plan, there were under execution thirteen large irrigation projects (including multipurpose projects) costing about Rs.5 crores and Rs.1 crore each and fortyeight costing Rs.10 lakhs to a crore of rupees. The total expenditure on these was Rs.550 crores besides Rs.150 crores on tubewells and minor irrigation works. When it is remembered that the capital cost of all the larger irrigation works that fell to India's share at the time of partition is Rs.110 crores, the magnitude of this five year programme can be easily appreciated. What is important is that, in most cases, execution is keeping pace with the schedule and the entire programme is going through satisfactorily. Steps have been taken on the administrative and technical side for strengthening the machinery for implementing large multipurpose and irrigation and other projects and placing the financial arrangements for them on a sound basis.

A review of technical personnel needed in future years is being conducted. I must also mention the steps taken for conserving vital national resources like the legislation for ensuring river valley development on a national basis, the law enacted for conserving coking coal and the measures for preventing soil erosion and building up soil fertility.

Next is the third question - how of a new pattern of society is emerging and the measure of social justice achieved in the five years of the Plan. The Progress Report gives a summary of land reform legislation in the States. This takes two forms. The first is the abolition of intermediaries. This has been completed in all States. The second is tenancy legislation. This guarantees fixity of tenure and fair rents and right to purchase ownership on payment of moderate compensation. Tenancy reform has been undertaken in most States. As the result of these laws, a new rural order is being created.

There has also been other measures with the same end in view-labour laws including one for fixing minimum wages in agriculture; schemes for colonization for agricultural labour; assistance to cooperative farming, etc. There are also special programmes of development for the welfare of backward classes, tribal areas and displaced persons. The same idea of social justice underlies the legislation undertaken for ensuring that the "private sector" industry subserves the larger social condition of labour- viz., the bipartite machinery for adjusting differences, provident funds, retrenchment benefits, etc. Obviously these movements will gain momentum in the coming years and the process of social and economic change will be accelerated.

The last question is the achievement of targets in the public and private sectors. The Progress Report deals with this in much detail and it is unnecessary to repeat what has been said there. Food production has been good and State industrial concerns are working satisfactorily. The large and medium irrigation and power projects are proceeding according to schedule. In the private sector, most of the industries have fulfilled targets and in some cases exceeded them.

As the result of the First Five-Year Plan there has been an increase of 18 percent in the national income or on the average about 3 percent every year and direct employment has been provided for 4.5 million persons.

IV. Details of the Second Five-Year Plan

The size of the second plan is a subject to which much thought has been given by the Planning Commission. It was first contemplated that in the public sector, the outlay might be of the order of Rs. 4,300 crores. It was soon found that as the needs to be met were large and the technical and administrative organizations at the disposal of the Central and State Governments were capable of executing programmes of larger magnitude than before, the aggregate size had to be increased to at least Rs. 4,800 crores. The increase was due almost entirely to the development of heavy industries and the improvement of the railway system which these rendered necessary. The net investment proposed in the second plan is, therefore, of the order of Rs. 6,100 crores - Rs. 3,800 crores in the public sector and Rs. 2,300 crores in the private sector. The "development" expenditure amounts to another Rs. 1,000 crores. The aims of the plan may be formulated as follows:

- a. An increase of 5% every year in the national income;
- b. Provision of employment to 10 million people;
- c. Rapid industrialization with particular emphasis on the development of basic and heavy industries and on their coordination with a planned expansion of cottage and small scale industries in an extensive scale;
- d. Reduction of inequalities in income and wealth and a more even distribution of economic power, thus helping in the creation of the socialistic pattern of society.

The allocations of the total expenditure in the public sector are as follows:-

SECOND PLAN

	<u>Total Provision</u>	<u>Per cent</u>
	(In crores of Rupees)	
1. Agriculture and Community Development	565	12
2. Irrigation and flood control	458	9
3. Power	440	9
4. Industries and minerals	891	19
5. Transport and communications	1384	29
6. Social Services, housing and Rehabilitation	956	20
7. Miscellaneous	116	2
T O T A L	<u>4800</u>	<u>100</u>

On the total expenditure in the second plan, industry and mineral development together with transport and communications claim merely one-half of compared to about a third of the total in the first plan. Irrigation and other schemes directly related to agricultural development account for about one-fifth of the total in the first plan they accounted for about a third. The outlay on social services is about the same percentage, about one-fifth, in both plans. The expenditure under large-scale industries, scientific research and minerals is expected to be about one-fifth of the total outlay and about four or five times the amount allotted under the first Plan.

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The total expenditure in the private sector is tentatively to be as follows:

	<u>Total Provision</u> (In crores of Rupees)
1. Organized Industries and Mining	500
2. Plantations, private transport and electricity undertakings	100
3. Agriculture and village and small industries	300*
4. Construction (houses, shops, schools, hospitals etc.)	1,000
5. Additional investment in Stocks	400
T O T A L	<u>2,300</u>

The total investment under the second plan is more than 75 % larger than the first plan and the ratio of public and private investment roughly works out at 62:38.

A plan of this magnitude calls for a great effort from the nation. The tentative estimate of financial resources against the outlay, of Rs.4,800 crores is as follows:

	<u>In crores of Rupees</u>
1. Surplus from current revenues:	800
a. at existing rates of taxation	350
b. additional taxation	450
2. Borrowings from the Public:	1200
a. market loans	700
b. small savings	500
3. Other budgetary sources:	400
a. Railways' contribution to the development programme	150
b. Provident funds and other deposit heads	250
4. External Assistance	800
5. Deficit Financing	1200
6. Uncovered gap	400
T O T A L	<u>4800</u>

Two points deserve special comment. The first is, the raising of the taxation resources. The additional taxation of Rs.450 crores over the five year period will only slightly raise the taxation national income ratio which is 7%. The second is the need to exploit every possible new source of savings that arises as development proceeds under the plan. Every effort must be made by each family in the nation to raise voluntarily the necessary resources. There is no doubt that the country has the resources - potentially at least, but they must be drawn into the productive system. The second plan must rely for its success on an intensified saving's drive in which all sections of the community must participate.

* This refers to monetised investment only. The non-monetised investment can not be estimated.

To provide the resources needed for the second Five-Year Plan for public and private sectors the rate of investment should rise from the present rate of 7% of the national income to about 11 to 12 % at the end of the Five-Year period.

Priorities are a matter of relative-emphasis. Basically we need all round development and although the second plan places a larger emphasis on industrial development, it will be necessary for us to ensure that the outlay in various directions is well balanced so that it gives the maximum return in terms of goods and services. The emphasis on heavy industry is justified by the further development that it will make possible. The output of finished steel is planned to increase from 1.3 million tons in 1955-56 to 4.3 million tons in 1960-61; of coal from 37 to 60 million tons; of cement from 4.8 million tons to 10 million tons; of heavy chemicals from 275 to 820 thousand tons. This emphasis on heavy industry is not a break with the past five years. It is, in fact, in direct continuity with the development under the first plan and was stressed in the report of the Fiscal Commission. India is among the first 10 leading industrial countries of the world, but due to the half-hearted policy of protection that was followed, consumer goods industries were developed at the expense of basic industries. The distortions in the industrial structure were accounted during the last war. This imbalance will be rectified at the end of the Second Plan.

As a result of the Second Plan, national income is expected to increase from Rs.10,800 crores in 1955-56 to about Rs.13,480 crores in 1960-61 viz. by about 25 %. This will mean an increase of about 18 % in per capita incomes (from Rs.280 crores in 1955-56 to Rs.330 crores in 1960-61). Additional employment will be provided for 10 million persons. This will include the labour force added every year amounting to about 9 million and a small portion of these new unemployed and under employed.

The execution of the Plan will involve a substantial increase in imports, especially of machinery, steel and other industrial requirements. Experts will be expended as far as possible in order to earn the foreign exchange required to pay for these imports. In spite of this, there is likely to be a balance of payments deficit of the order of Rs.11,000 million. To some extent, the foreign exchange gap can be met by drawing down the sterling balances. For the rest, we shall have to explore all avenues to raise the required resources abroad-private investment, loans from international agencies and institutions, floatation of issues in foreign markets, negotiation of suppliers' or bankers' credits and loans on a Government to Government basis.

It is an integral part of our thinking that the Five-Year Plan should not be regarded as a rigid one. The intension is to work it in a flexible manner through annual plans, effecting adjustments in the light of economic and financial trends, increase in production and the progress made from time to time under different heads of the Plan.

On the basis of result achieved so far, I think we may hope that the large national effort needed for the plan will be forthcoming. There are several factors on the credit side. The people's response has been encouraging, and their sense of real values, intense realism and inherited skill, are valuable assets. The economy has achieved a measure of stability and the administration and non-official leadership are adapting themselves to difficulties to be surmounted. The pace of development must be considerably accelerated if the serious evil of unemployment is to be overcome.

employment - including educated unemployment - has to be tackled successfully. This requires a determined effort "on a war footing". A rough estimate is that about 25 million jobs will have to be found in the next 10 years. There will have to be a more widespread recognition that national savings and voluntary contributions of labour on an impressive scale will be essential for future plans if they are to find solutions for the intractable problems facing the country. Some countries mobilise the needed resources on the basis of compulsion of one sort or the other. We have to do this on a voluntary and democratic basis. These are challenges the nation has to meet in the coming years.

V

INDIAN COOPERATIVE UNION

A REVIEW
of the
REPORT OF THE COMMITTEE ON COOPERATIVE LAW
of the Ministry of Food and Agriculture
Government of India

56, Janpath
New Delhi - January 1959

The INDIAN COOPERATIVE UNION LTD is a voluntary
non-profit organisation devoted to economic and
social development through cooperation.

President: Kamaladevi Chattopadhyay

General Secretary: L.C. Jain

Its offices are located on Janpath, New Delhi

FIRST IMPRESSION
1959

This Review is published by the PUBLICATIONS DIVISION
of the Indian Cooperative Union and printed at
THE CAXTON PRESS New Delhi India

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A REVIEW of the REPORT OF THE COMMITTEE ON COOPERATIVE LAW

INTRODUCTION

There is a growing realisation in the country that cooperatives are neither developing nor fulfilling the larger social, economic and democratic aspirations expected of them. Among other causes the existing Cooperative Act of 1912 and rules and byelaws are considered as obstructions in the way of rapid development of the cooperatives and the individual initiative of their members. Co-operators have been saying this for a long time and recently this view has also been voiced vigorously and persistently by the Prime Minister. In its resolution on Cooperative Policy, the National Development Council (November, 1958) also declared:

The Central and State Governments have been engaged in considering measures for simplifying the present procedure for registration of cooperative societies, grant of loans and management of cooperatives. Many of the existing procedures impede the development of cooperation as a popular movement in which small groups and communities can function freely and organise their work and activities along cooperative lines without excessive official interference and red tape. The restrictive features of the existing cooperative legislation should be removed and both the present cooperative laws and the model legislation and rules which have been under the consideration of States should be modified in accordance with the approach outlined in this Resolution.

In this context, the Report of the Committee on Cooperative Law appointed by the Ministry of Agriculture merits close examination.

2. THE LAW COMMITTEE, its membership and terms of reference

The Committee was appointed in 1956 and its Report was submitted in 1957. The Report consists of two parts. Part I gives the Model Bill and Model Rules recommended by the Committee for adoption by the State Governments. Part II gives Model Byelaws recommended for different types of societies in the light of the Model Bill and Rules.

The eight members of the Committee* were all officials of the Central and State Governments and the Reserve Bank. Not a single non-official was drawn from the Cooperative Movement. The Committee was called upon to review the existing cooperative legislation and to make recommendations for a simple legislative measure generally suited to the whole country to facilitate coordinated progress of the *Movement*. It was also to examine, in the light of the recommendations of the Rural Credit Survey Report, the modifications necessary in the Cooperative Societies Act and rules for giving effect to the concept of *State partnership in share capital* and *State participation in management* of Cooperative Societies.

The examination of the present rules and byelaws, etc., and suggestions for modifications were to be made to enable the societies to "play an increasingly important role in the economic development of the country." It was also to suggest standard sets of byelaws to facilitate the proper and smooth working of the "new types of societies which are sought to be encouraged under the changed economic and social policy."

3. PRINCIPLES ADOPTED BY THE COMMITTEE in modifying the existing cooperative laws

Before examining the specific recommendations of the Committee it is essential to know the principles which guided the Committee in modifying the present laws.

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- * 1. Shri S. T. Raja, Joint Secretary, Ministry of Food & Agriculture, Government of India, New Delhi—Chairman
 2. Shri S. K. Hiranandani, Additional Draftsman, Ministry of Law, Government of India, New Delhi
 3. Shri J. C. Ryan, Chief Officer, Agricultural Credit Department, Reserve Bank of India, Bombay
 4. Shri K. Subrahmanyam Nayudu, Registrar, Cooperative Societies, Andhra
 5. Shri S. S. Puri, Registrar, Cooperative Societies, Punjab
 6. Shri M. D. Vidwans, Professor of Law, Cooperative Training College, Poona
 7. Shri A. Palaniappa Mudaliar, Registrar of Cooperative Societies, Madras
 8. Shri M. P. Bhargava, Cooperative Adviser, Ministry of Food & Agriculture, Government of India—Member-Secretary

At its second meeting at New Delhi the Committee "considered some of the broad principles to be adopted in modifying the existing cooperative laws and decided to proceed further when more replies were received."

At its third meeting the Committee was "in possession of most of the replies to the questionnaire", which were considered in the light of an "objective study, which had been made in the meanwhile, of the cooperative legislation in force in the different States"; and "it had the benefit of the draft of a model Cooperative Societies Act, prepared by one of its members." "With such valuable material before them, the Committee was able to lay down the broad principles" on which to base its recommendations.

Although repeated reference is made in the Report to the broad principles these are not mentioned anywhere in the Report.

Further, the terms of reference of the Committee used the phrase "changed economic and social policy", which is nowhere explained or elaborated either in the terms of reference or by the Committee itself.

The last possible place for a mention of these guiding principles could have been the preamble to the Model Bill recommended by the Committee. Here again we fail to find them: "The Model Bill recommended by us does not contain a preamble. Several of the replies to our questionnaire suggest that the principle of State partnership may be embodied in the preamble as it is one of the most important recommendations of the Rural Credit Survey Report. Since laws passed after the enactment of the Constitution do not generally contain any preamble, we consider that there need not be any preamble to the Cooperative Societies Bill also."

Except for embodying State partnership in the Model Bill, no clue is given to other principles which guided the Committee.

The Committee hopes that the statement of objects and reasons, to be published along with the Bill, will contain references "to principle of State partnership in cooperative societies and State participation in their management, and also to the principle of self-help and mutual-help and to the objectives of promoting better living, better business and better methods of production." The Committee itself does not provide any draft statement. But this observation of the Committee is very significant and provides a key to the understanding of the rest of the Report. The Committee has laboured hard to introduce provisions to give legal sanction to State partnership and State participation in management of cooperative societies. Nowhere are the principles of self-help and mutual-help manifested in its recommendations. If anything, these have been undermined, as we shall show later.

The only factors recognised by the Committee which necessitate revision of the existing cooperative laws are "the implementation of the Rural Credit Survey

and of the schemes of cooperative development under the Second Five-Year Plan require the revision of the Cooperative Societies Act.”

In discussing the various phases in the growth of legislation in India it refers to the attainment of Independence by the country in 1947, but the only significance of that fateful event which attracted the attention of the Committee was “the emergence of new States in the Indian Union.”

Again, among the six “landmarks”* regarded by it as important in the history of cooperative legislation in India, the Constitution of India embodying the directive principles of State policy and fundamental rights of the citizens guaranteeing their sovereign and democratic life does not find mention. (The Report of the Rural Credit Survey and the Second Five-Year Plan are however included in the six landmarks).

It is also significant in this context that the Committee nowhere mentions the Report of the Cooperative Planning Committee of the Government of India. Incidentally, one of the members of the Committee on Cooperative Law was also a member of that Committee.

The Cooperative Planning Committee, which functioned at a time when India was still ruled by the British, observed:

First, for the success of Cooperation, a responsible democratic form of Government is necessary, as it alone creates an atmosphere for the development of individual initiative and sense of responsibility.

Unfortunately, the recommendations of the Committee on Cooperative Law are not at all informed by this basic realisation. The Committee has missed the entire significance of India's independence, and the adoption of a democratic constitution which has paved the way for developing cooperatives with a view to strengthening the base of democracy by development of individual initiative and sense of responsibility.

The Committee's recommendations are obviously not governed by any principles of either cooperation or the changed economic and social policy or by the directive principles of state policy as laid down in the Constitution.

The Indian Constitution replaced the India Act of 1935 so as to reflect the dawn of a new life of sovereignty and the aspirations of the Indian people to live and grow in the spirit of democracy. A whole series of subsidiary Acts in operation when the Constitution was adopted were not replaced but were

*1. The Cooperative Credit Societies Act, 1904

2. The Cooperative Societies Act, 1912

3. The Constitutional Reforms, 1919

4. The attainment of Independence by India and the merger of Princely States, 1947

5. The Report of the All-India Rural Credit Survey, 1954, and

6. The Second Five-Year Plan, 1956

to be revised, changed and modified in the context of the Constitution, and the cooperative principles so far as laws relating to cooperative societies are concerned. As it is, good, bad or indifferent, there are several lakhs of people who are members of different cooperative societies; and many millions more are hoped to be drawn into it to find the fruits of freedom, democracy, and increased economic opportunities and prosperity. One would not compare the task of framing an appropriate legislation for cooperative movement (from which so much is expected) with that of the framing of the Constitution. But between the Constituent Assembly and the Cooperative Law Committee the gap is astounding and one is forced to the conclusion that its appointment was made with complete lack of responsibility towards millions of people whose life the cooperative law is to embrace.

It is necessary to stress this point, for, in a democratic society, the individuals are expected to obey the law. This imposes a serious and sacred responsibility on the law-makers to take their task seriously and with thoroughness of method, and to frame laws in conformity with the political, social and economic aspirations of a free and democratic people. The laws should create the conditions necessary for national ideals to be achieved and not to be subverted.

4. THE METHODOLOGY followed by the Committee

The Committee decided to take two steps:

- (i) to undertake an "objective analysis" of the existing Act, rules and byelaws; and
- (ii) to issue a questionnaire to various persons, institutions and authorities.

The Committee does not report having held any discussions with representatives of the Cooperative Movement at any stage on any matter.

The questionnaire issued by the Committee was sent to the following:

Authorities

All State Governments

All Registrars of Cooperative Societies

The Reserve Bank of India

The State Bank of India

The Planning Commission

The Ministry of Commerce & Industry

The Ministry of Works, Housing & Supply

The Ministry of Production

The Houses of Parliament and the State Legislatures

Commodity Committees

The All India Khadi and Village Industries Board
 The Community Projects Administration
 The All India Handloom and Handicrafts Boards
 The Cooperative Training College at Poona and other
 Cooperative Training Institutions (run by the Reserve Bank and the Government)

Cooperative Movement

All India Cooperative Union

Others

All Bar Associations of High Courts

The Registrars of Cooperative Societies were requested to circulate copies of the questionnaire to all the important cooperative institutions in their States.

The contact with the greatest, most valuable and important source of information was thus made *indirectly* through the Registrars of Cooperative Societies. As earlier mentioned, the Committee itself did not have a single non-official member from the Cooperative Movement; and it did not apparently resort to any personal discussions with the cooperators to solicit information.

The sources from whom it received replies to its questionnaire may also be analysed:

- 24 Registrars and officials
- 36 Cooperative Banking institutions
- 11 Officers of Cooperative Training Institutions
- 16 Individuals
- 11 Cooperative bodies
- 3 Bar Associations
- 2 Miscellaneous

The Reserve Bank's unique position *vis-a-vis* the Cooperative Banks is well known. The Cooperative Training Institutions are, as already stated, run by the Reserve Bank and the Government.

The Report does not say (other than to name them) who the 16 individuals are nor what their standing is in the cooperative movement, nor on what basis they were requested to tender advice to the Committee.

The eleven Cooperative Unions, federations and societies from whom it received replies were:

- 1. M. P. Weavers Central Cooperative Society Ltd., Nagpur
- 2. M. B. Kendriya Sahakari Sanstha Ltd., Indore
- 3. Tamilnad Cooperative Federation, Coimbatore (Madras)
- 4. Vidarbha Cooperative Institute, Amraoti (Bihar)

5. Madras State Cooperative Union Ltd., Madras
6. Punjab Cooperative Union Ltd., Jullundur
7. Maharashtra Divisional Cooperative Board, Poona
8. The Madras State Handloom Weavers Cooperative Society Ltd.
9. The State Industrial Cooperative Association Ltd., Bombay
10. Bhucho Cooperative Cotton Development and Marketing Society Ltd., Bhucho Mandi (Ferozepur)
11. Haryana Cooperative Sugar Mills Ltd., Rohtak (Panjab)

Official statistics claim the existence in India of over 2,36,450 cooperative societies*. Adding even the 36 cooperative banking institutions to the other eleven cooperatives, who answered, this could hardly be taken as a representative sample in any sense of the term.

If nothing else, the Committee could have at least given a summary of the important problems brought to its notice by (a) cooperative societies and (b) the Registrars etc. in the replies received by it. One could have then examined whether the recommendations of the Committee really met the problems that were brought to its notice.

The Methods followed by the Committee were bound to be weak and uncertain, in the absence of any guiding principles, but the casual manner in which it obtained data and information is very regrettable.

5. Some important recommendations of the Committee : MODEL BILL

(a) *AUTHORITY AND CONTROL OF THE REGISTRAR*

1. *Single Authority:* The Cooperative Act of 1912 provides that the Government may, if desired, appoint a Registrar for only a portion of a State. This was to facilitate the appointment of more than one Registrar where necessary. The Cooperative Law Committee has deleted this provision as such a provision in its view "would be inconsistent with the concept of a single authority for the purpose of guiding, supervising and controlling the work of cooperative societies in the entire State." Imagine a State like Uttar Pradesh or Bombay where a large number of cooperatives already exist and thousands of new ones are to be promoted. Again, the societies are to embrace practically all fields of economic and social endeavour: agriculture, cottage and small scale industries, consumers' stores, housing, thrift and credit, labour contract, transport, etc., involving several million members. The concept of a single authority in such a situation could hardly be in the best interests of the Movement. One does not, however, understand why the Committee has gone out of its way to suggest the removal from the statute of an existing provision which is merely an enabling instrument.

*These 2,36,450 societies are federated through 3,398 district level societies and 91 State level societies,

2. *Conditions of Registration of Societies:* Firstly, the Committee recommends registration of a society which has as its objects the promotion of the "economic" interests of its members. Why only economic? Or are the cooperatives to be reduced to mere commercial units? Especially in the context of the changed economic and social policy in which new types of cooperatives are also to be fostered, one would have thought that the definition would be broadened and not made narrower than it has been hitherto.

This is immediately followed by another condition that the "proposed society complies with the requirements of sound business".

It is left to the Registrar to be satisfied on these points as a condition precedent to registration.

The Registrar is also to be satisfied that the aims of the society are not "inconsistent with the principles of social justice." The principles of social justice are not defined by the framers of the Report thus leaving them to be interpreted by the various Registrars.

The Committee states that it had to lay down these conditions so as to prevent the registration of cooperative societies which are not genuinely cooperative in character.

It appears to us, however, that it was not so much because of any inadequacy in the existing laws that doubtful cooperatives could get themselves registered, but because of the failings of the registering authorities.

The Committee itself admits that "under the 1912 Act, a society which complied with the provision of the Act and the rules and whose byelaws were not contrary to the Act and the rules, could be registered by the Registrar".

But the Committee states that "the provisions have not been adequate in preventing the registration of societies which are not genuinely cooperative in character." It does not show which of the existing provisions lend themselves to abuse, nor does it anywhere define what the Committee considers to be "cooperative in character".

A society seeking economic success should be able to comply with requirements of sound business. But will the Registrars be competent to determine this, when each society will have a different nature of business, when the level of members' skill of management, marketing, manufacture, etc., would vary from society to society? The Registrar may advise and persuade them before registration. But this is primarily for the members to decide. The members may genuinely hold another view of their business prospects and ability. It is too much to give statutory powers to the Registrar to refuse registration on such grounds.

3. *Amendment of byelaws:* The conditions to be imposed statutorily for registration of societies are to apply for registration of amendments also.

4. *Limited or unlimited liability*: Section 4 of the 1912 Act provides that unless the local Government so directs, the liability of a primary credit society of which the majority of the members are agriculturists shall be unlimited.

The Cooperative Planning Committee had recommended that "a society may adopt limited or unlimited liability. Again a provision should be made in the Act enabling societies to change their liabilities. This has been provided for in Madras and Bengal".

The Committee on Cooperative Law, on the other hand, recommends that:

no cooperative society shall be registered with limited liability, if

- (i) its primary object is the creation of funds to be lent to its members;
- (ii) the majority of its members are agriculturists; and
- (iii) none of the members is a cooperative society.

The Committee however faced some internal dissension on this point as it records that "There was, however, another view forcefully expressed" that "making unlimited liability compulsory would deter persons from becoming members of cooperative societies." Despite this the Committee retained the provision quoted above but agreed to leave the matter to the State Governments.

5. *Supersession*: In one paragraph the Committee expresses itself against the Government having power to veto or give directives to cooperative societies but it adds that the State Government or the Registrar should take "suitable administrative measures in this behalf". It proceeds to amplify these "administrative measures":

Supersession of a Committee—There is no provision in 1912 Act [enacted by the British Government] for the removal by the Registrar of the committee of a cooperative society, if it mismanages its affairs. Such a provision exists either in the Act or in the rules in most States. Under the Punjab Cooperative Societies Act, however, such power is restricted only to those societies in which Government has major financial interest. We consider that it is necessary to invest the Registrar with power to supersede the committee of any society under certain circumstances and that this power need not be confined only in respect of such societies in which Government has major financial interest.

The person or persons appointed by the Registrar to manage the affairs of a society where a committee is to be superseded by the Registrar will "manage the affairs of the society for a period not exceeding *two years* specified in the order which period may, at the discretion of the Registrar be extended from time to time, so however, that the aggregate period does not exceed *four years*". (italics ours).

The Committee obviously believes that a society which is managed for four years by the Registrar or his nominee could still be called a cooperative society. If its membership is so ignorant and helpless, is it necessary to call it a cooperative society and maintain it under bureaucratic control for years? It may as well be liquidated. Even in the case of President's rule being extended to a State there is a safeguard that after eight months a Government

of elected representatives should be installed. A cooperative society is an institution of the people and it is for them to elect, suspend and appoint their managing committee or managers. If the Registrar finds any defects in the management he can, under the laws, bring them to the notice of the general body of the society which consists of all its members—personally or through a written communication. The Report also says “the final authority in a cooperative society shall vest in the general body of members” but wherever it proceeds to vest extraordinary powers to the Registrar undermining the autonomy of a cooperative, it completely ignores the “final authority” of the society.

6. *Inspection made Statutory:* The Registrars, in view of their immense power over the societies, have made a custom of “inspecting” cooperative societies—a practice which was not supported by the Cooperative Act of 1912. The Law Committee has seized this opportunity to make statutory provision for a practice which cooperators have throughout resented and abhorred. The Committee states “we consider it desirable to give statutory recognition to this practice.” It certainly was an advantage to have no representative of the Cooperative Movement on the Committee. The very use of the word “inspection” in relation to cooperative societies is highly questionable.

7. *Inquiry by Registrar:* The Committee recommends that:

- (1) The Registrar may of his own motion, by himself or by a person authorised by him by order in writing, hold an inquiry into the constitution, working and financial condition of a cooperative society;
- (2) An inquiry of the nature referred to in sub-section (1) shall be held on the application of
 - (a) a cooperative society to which the society concerned is affiliated;
 - (b) a majority of the members of the committee of the society; or
 - (c) not less than one-third of the total number of members of the society.

The cooperatives cannot have any internal autonomy, so long the Registrar is allowed to hold an inquiry of “his own motion”.

It further recommends

- (3) The Registrar, or any person authorised by him under sub-section (1) shall, for the purposes of an enquiry under this section, have the following powers, namely:
 - (a) he shall, at all times, have free access to the books, accounts, documents, securities, cash and other properties belonging to or in the custody of the society and may summon any person in possession or responsible for the custody of any such books, accounts, documents, securities, cash or other properties, to produce the same at any place at the headquarters of the society or any branch thereof;
 - (b) he may summon any person who, he has reason to believe, has knowledge of any of the affairs of the society to appear before him at any place at the headquarters of the society or any branch thereof and may examine such person on oath; and

- (c) (i) he may, notwithstanding any rule or byelaw specifying the period of notice for a general meeting of the society, require the officers of the society to call a general meeting at such time and place at the headquarters of the society or any branch thereof and to determine such matters as may be directed by him and where the officers of the society refuse or fail to call such a meeting, he shall have power to call it himself;
- (ii) any meeting called under clause (i) shall have all the powers of a general meeting called under the byelaws of the society and its proceeding shall be regulated by any such byelaws except that no quorum shall be necessary for such meeting.

These are sweeping executive and judicial powers which would completely subordinate the cooperative to the Registrar's control, especially if he is also allowed to hold such enquiries of his own motion. If the state of affairs of a society reach such a point, the enquiry must be held under judicial auspices. The power to hold a meeting without a quorum amounts to the inquiry officer taking the decision himself; this is indeed an extraordinary provision.

8. *Winding up of a Cooperative Society:* The Committee recommends:

- (2) The Registrar may of his own motion make an order directing the winding up of a cooperative society:—
 - (a) where it is a condition of the registration of the society that the society shall consist of at least ten members and the number of members has been reduced to less than ten; or
 - (b) where the cooperative society has not commenced working or has ceased to work.
- (3) The Registrar may cancel an order for the winding up of a cooperative society, at any time, in any case where, in his opinion, the society should continue to exist.

The Section (b) is very omnibus; provides for no safeguards and may be open to misuse.

In no case should the Registrar be able to take any action without giving reasonable notice to a society concerned in writing and by giving it a reasonable opportunity to present its views.

The powers suggested for the Registrar of winding up of a cooperative society, appointment of a liquidator, show no regard for the autonomy of the cooperative societies.

9. *Appeals:* The Cooperative Planning Committee had recommended as early as in 1946 that

The 1912 Act does not provide any right of appeal against the decision of the Registrar refusing to register a society. We feel that a specific provision for appeal against such refusal should be made in the Act as is the case with regard to an order cancelling the registration of a society. This has been done in Section 10 of the Madras Act and Section 64 of the Bombay Act.

The 1912 Act gives unlimited powers to the Registrar to reject amendments to the byelaws of a registered society. We are of the opinion that he should ordinarily

register all amendments which are in conformity with the Act and Rules. In cases where he rejects an amendment he should assign reasons therefor and an appeal to government may lie within two months after the rejection which shall be intimated by registered post. (page 164, paras iii and iv).

The Law Committee has indeed provided for appeal in both these and other matters. But by another provision it has been ensured that in actual practice no appeal could be made to the State Government if the Registrar so desires, as will be obvious from a study of following.

On page 107, the Report recommends that an appeal shall lie against the following categories of orders:

- (i) refusal to register a society;
- (ii) refusal to register an amendment;
- (iii) the Registrar removing the committee of a cooperative society;
- (iv) the Registrar apportioning the costs of an enquiry or an inspection made, or a surcharge made;
- (v) the Registrar ordering the winding up of a society;
- (vi) an order made by the liquidator of a society;
- (vii) an order for attachment of any property made by the Registrar.

But on page 108, it lays down that an appeal against any of these matters shall be made:

- (a) to the State Government, if the decision or order was made by the Registrar; or
- (b) to the Registrar, if the decision or order was made by any other person, or a cooperative society.

No appeal shall lie under this section from any decision or order made by the Registrar, in appeal:

Explanation: For the purposes of this section, Registrar shall not include any person exercising all or any of the powers of the Registrar.

On page 72 it lays down that "Every person appointed to assist the Registrar" on whom the State Government may "confer all or any of the powers of the Registrar" shall exercise the powers conferred on him "subject to the general superintendence and control of the Registrar."

Technically, therefore, the Registrar must be held responsible for all decisions taken by his subordinates and there can be no escape from appeal going to the State Government under the cover that the decision was taken by a subordinate officer. The Registrar can conveniently ensure that all orders are given by his subordinates whom he can cover in appeal, thus defeating the very purpose of providing for an appeal.

(b) CONTROL OVER AUDIT

In addition to his executive control the Registrar is also in charge of audit of societies. The Cooperative Planning Committee had observed in 1946 that "the practice of combining the functions of audit and supervision in one person is undesirable as it is likely to lead to inefficiency. If the person who supervises the working of a society also audits its accounts many defects in the working are likely to remain undetected." The Cooperative Law Committee, on the other hand, observes that "the important point to be borne in mind is that the Registrar of Cooperative Societies, who is responsible under the law for the proper conduct of societies, cannot fulfil his responsibility satisfactorily unless he keeps in close touch with the working of these societies by getting their accounts audited *under his direction and control*," and that "the Chief Auditor" appointed for this purpose "will be responsible to and work under the control of the Registrar of Cooperative Societies". Even for the Government of India or State Governments such a freedom does not exist and the Comptroller and Auditor General and the Accountant General are given statutory safeguards to be free of executive control.

After declaring in paragraph 18 that the Government should not interfere in the day-to-day administration and working of the societies, and should not therefore have the power to veto or give directives to cooperatives, the Committee recommends in para 35 that "it is necessary to empower the Registrar under the Act to give a *directive* to a cooperative society to rectify the defects indicated in the audit report". Thus the method of effecting improvements would, therefore, continue to be one of giving directives, or in other words of interfering with the working of societies *de facto*. Obviously the Registrar ought only to call the attention of the society to the defects indicated in the audit report and request rectification or ask the society for its explanation. Where no rectification or explanation is forthcoming and there is proved evidence of maladministration of accounts, other remedial measures are available. A *directive* on first motion seems to us unwarranted.

(c) JUDICIAL POWERS OF THE REGISTRAR

In para 38 the Committee has recommended that to avoid prolonged and expensive litigation, no court should have jurisdiction to entertain any suit or other proceeding in respect of disputes of cooperative societies.

In para 39 the Committee states that in several States the law at present permits reference of disputes to three or more arbitrators, one each to be named by the parties to the dispute and one to be named by the Registrar to serve as Chairman of the Panel of Arbitrators. The Committee recommends that "as reference of disputes to more than one arbitrator is likely to hinder a speedy settlement of disputes, we have not provided in the Model Bill for the reference to a panel of arbitrators of a dispute". The Registrar may now "settle a dispute himself or appoint another *officer* of the Cooperative Department to do so or appoint an arbitrator".

Thus the Registrar, already empowered fully with powers of control, supervision, audit and giving of directives and superseding of committees of the cooperative societies, is also armed with all the judicial powers. In one stroke the jurisdiction of the law courts of the land over cooperatives is withdrawn, appointment of arbitrators by the parties is withdrawn, and full power is vested in the Registrar to arbitrate "any dispute touching the constitution, management, or the business of a cooperative society". For a fuller appreciation of the judicial powers to be exercised by the Registrar, it is necessary to reproduce the relevant provisions recommended by the Committee in full:

65. Disputes which may be referred to arbitration:

- (1) Notwithstanding anything contained in any law for the time being in force, if any dispute touching the constitution, management, or the business of a co-operative society arises
 - (a) among members, past members, and persons claiming through members, past members and deceased members, or
 - (b) between a member, past members or person claiming through a member, past member or deceased member and the society, its committee or any officer, agent or employee of the society, or
 - (c) between the society or its committee and any past committee, any officer, agent or employee, or any past officer, past agent or past employee or the nominee, heirs or legal representatives of any deceased officer, deceased agent, or deceased employee of the society, or
 - (d) between the society and any other cooperative society, such dispute shall be referred to the Registrar for decision and no court shall have jurisdiction to entertain any suit or other proceeding in the respect of such dispute.
- (2) For the purposes of sub-section (1) the following shall be deemed to be disputes touching the constitution, management or the business of a cooperative society, namely
 - (a) a claim by the society for any debt or demand due to it from a member or the nominee, heirs or legal representatives of a deceased member, whether such debt or demand be admitted or not;
 - (b) a claim by a surety against the principal debtor where the society has recovered from the surety any amount in respect of any debt or demand due to it from the principal debtor as a result of the default of the principal debtor, whether such debt or demand is admitted or not;
 - (c) any dispute arising in connection with the election of any officer of the society.
- (3) If any question arises whether a dispute referred to the Registrar under this section is a dispute touching the constitution, management or the business of a cooperative society, the decision thereon of the Registrar shall be final and shall not be called in question in any court.

66. *Reference of disputes to arbitration*—(1) The Registrar may, on receipt of the reference of a dispute under section 65

- (a) decide the dispute himself, or
- (b) transfer it for disposal to any person who has been invested by the State Government with powers in that behalf, or

(c) refer it for disposal to one arbitrator.

(2) The Registrar may withdraw any reference transferred under clause (b) of sub-section (1) or referred under clause (c) of that sub-section and decide it himself.

(3) The Registrar or any other person to whom a dispute is referred for decision under this section may, pending the decision of the dispute, make such interlocutory orders as he may deem necessary in the interests of justice.

An appeal is however provided against the decision of the Registrar in this matter, to a special Tribunal to be set up by a State Government.

But the delegation of such powers to the Registrar in the very first instance is a violation of the Constitution, as one of the Directive Principles of State Policy require that judicial powers should be separated from the executive.

The disputes should be adjudged by the Tribunal first, and appeal allowed to the High Court.

Powers to execute decree and attach property

Further, the Committee recommends that the Registrar should be empowered to execute decrees or awards, etc., departmentally. This is coupled with the powers "to pass an order for attachment of property before judgement in any proceeding under the Act."

(d) STATE PARTNERSHIP AND STATE NOMINEES

The Committee recommends that a State Government may become a member of a cooperative society and "each person nominated by the State Government on the committee of the cooperative society shall have one vote."

This is a total violation of cooperative principles and under no circumstances can the Government be allowed to nominate persons on the managing committee of a society. It is measures like these which will never permit the development of any sense of responsibility and individual initiative in the cooperatives. Where the Government has lent money, it can as a lender ask for its representatives to be associated with the management of a cooperative society, if necessary.

The Committee recommends that "Section 39 to 49" of the chapter on State partnership "shall have effect notwithstanding anything inconsistent therewith contained in any other law" thus making these Sections supreme over everything else.

The Committee has subordinated all its deliberations to shaping cooperatives in the image of the Rural Credit Survey. The Committee, of course, in doing so has served the requirements placed on it by its terms of reference to incorporate the recommendations of the Rural Credit Survey Report in the Cooperative Law.

About the recommendations of the Rural Credit Survey itself, we may quote here from the Prime Minister's address to the Third Indian Cooperative Congress in April 1958:

I see from your four years' report or survey that there is a reference made in it to important decisions taken about three years or less ago, when the Rural Credit Survey Committee presented its report to the Government. In it the Committee referred to the Cooperative Movement and asked for far greater association of the State with the Movement financially and otherwise so as—it said—to vitalize it. Subsequently, the proposals of the Rural Credit Survey Committee in this respect were broadly accepted by our Government and are being progressively given effect to.

Now, I want to make a confession to you, and that is that I think our Government was quite wrong in accepting some of the decisions of the Rural Credit Survey Committee—not all, but some. I am sorry for it. I am responsible for it as much as anybody else. It is as much my fault as anybody else's. The more thought I have given to it, the more I have realised that the approach of the Rural Credit Survey Committee in some respects was not a right or sound approach and they tended to push the Co-operative Movement in this country in the wrong direction.

What was this wrong direction? There was a tendency on the part of that Committee to distrust our people, if I may say so, our common people, a tendency to think that they are not competent enough, that they cannot do a job by themselves; that, therefore, Government officials must come in and help, that Government money should push them up. If Government money comes, that money is followed by Government officials. The small cooperative has not enough resources or money or competent technical personnel; therefore, you should have large cooperatives, which can be started and helped by Government and so on. Now, I believe that that approach, which has certainly something to say for it—it may be argued that there is some reason behind it—was, nevertheless, a wrong approach, and it has given a wrong turn to our Co-operative Movement.

Ever since I realized this, I have been trying to point this out; and here on this occasion I should like to say to you who are chiefly responsible, that that approach, even though it might bring some results locally and temporarily, pushes the Cooperative Movement in a direction which is not cooperative at all, which is something else, and which offends against the whole philosophy which, I believe, has grown up round this Movement. Because, if it is to be a State-sponsored Movement, with Government officials running it, it may do some good if the Government officials are competent enough, but it does infinite harm in the sense that it does not allow the people to learn how to do things for themselves, how to develop a spirit of self-reliance, self-dependence, and even to make mistakes if they have to make mistakes.

6. Recommendations of the Committee : MODEL RULES

Not content with the powers proposed for the Government and the Registrar under the Model Bill, the Committee envisages complete autocratic control through the assumption of the following further powers which the administration would be able to lay down as it wishes from time to time.

The State Government is to make rules to carry out the purposes of the Model Bill, and some of the subjects on which it may make rules are stated in particular, without prejudice to its general power to make rules, e.g.,

1. Matters in respect of which the cooperative society shall or may make byelaws;

2. The qualifications or disqualifications of individuals who may be admitted as members of cooperative societies;
3. The election of members of the managing committee by the general body of a cooperative society;
4. The qualifications and disqualifications for membership of a committee of a cooperative society;
5. The qualifications of employees of cooperative societies;
6. The mode of investment of funds of a cooperative society;
7. The levy of audit fees on cooperative societies; and
8. The restrictions on persons appearing as legal practitioners.

These are a few of the 40 subjects listed in respect of which the State Government may make rules, in respect of any society.

Under the Model Rules drafted by the Committee for recommendation to the State Governments, we may cite just two to show the trend of authoritarian control:

Management of Societies (Clause 17)

Officers and employees of cooperative societies:

- (1) No cooperative society shall appoint any person as its paid officer or employee in any category of service, unless he possesses the qualifications and furnishes the security as specified by the Registrar from time to time, for such category of service in the society, or for the class of societies to which it belongs.
- (2) No cooperative society shall retain in service any paid officer or employee, if he does not acquire the qualifications or furnish the security as is referred to in sub-rule (1) within such time as the Registrar may direct.

This would mean that in addition to the powers of the Registrar to control a society in ways earlier discussed, he will also be able to interfere in the employment of staff of cooperative societies which has so far been within the powers of the cooperative societies themselves. The entrusting to the Registrar of the power to lay down the qualifications of lakhs of employees of cooperative societies is surely the most astonishing delegation of power open to dangerous abuse.

We may refer here to the warning of the International Congress of Jurists (Delhi Session) regarding delegated legislation:

A point of agreement among the jurists was that the grant of subordinate legislative powers to the executive should be within the narrowest possible limits and should carefully define the extent and purpose of delegated legislation and should provide for the procedure by which it could be brought into effect. (*Statesman*, 10th January 1959)

7. Recommendations of the Committee: MODEL BYELAWS

Part II of the Report suggests Model Byelaws for different types of societies, which are based on the Model Bill and Model Rules.

In view of the total rejection we have urged of the Model Bill and Model Rules themselves, no detailed comments are offered on the individual byelaws.

8. CONCLUSION

The Committee which was set up to simplify Cooperative Law and to modify it to enable cooperative societies "to play an increasingly important role" in the development of the country, has ended by setting up the Registrar's rule. The powers of the Registrar have been made absolute.

The Committee has chosen to revise the existing laws in such a way as to make cooperatives in India little colonies of backward, ignorant and helpless people to be "administered", "controlled", "supervised", "audited", "inspected", "superseded", "adjudged", and "dissolved" by "One Single Authority"—the Registrar of Cooperative Societies. Under the existing laws the Registrar was at best called a "benevolent dictator" or a "trustee" but the revision suggested by the Law Committee turns him into an absolute autocrat.

Here was an assignment of historic importance. The opportunity could have been utilised to carry democracy further than the five-yearly elections to Parliament and State Legislatures. Democratic values and precepts—the essence of cooperation—could have been made part of the day-to-day life and business of the people. With some social vision, the laws could have been so revised as to place the people in a position appropriate to a free and democratic people on whom the Constitution has already bestowed political sovereignty. The effect of the Law Committee's recommendations would be to subvert this sovereignty through unprecedented control and interference in the peaceful pursuit of economic activity—especially of a section of our people already too inarticulate and oppressed.

We suggest rejection of this Report by the Cooperative Movement, all cooperatives and the Central and State Governments. We hope that the Ministry of Community Development, which has recently assumed charge of Cooperation, will set up a new body in consultation with representatives of the Cooperative Movement to present to the country a new Cooperative Law.

The Indian Cooperative Union also hopes to submit shortly a memorandum to the Government and the public embodying some of the general considerations and guiding principles relevant to the framing of a new Cooperative Law.

Punjab VI

Tentative programme about the visit of Ford Foundation Team to Punjab State during the first week of February, 1959. The Team will leave Delhi ----- by car at 9.0 A.M., on 1-2-59 and proceed as under:-

Sunday 1.2.59.

Dep. Delhi 9.0 A.M.
Arr. Karnal 11.30 A.M.

Visit Indian Dairy Research Institute.

Dep. Karnal 3.0 P.M.
Arr. Nilokheri

Visit Training Institute.

Tea at Nilokheri.

Dep. Nilokheri
Arr. Chandigarh Evening.

Monday 2.2.59.
(10.30)

Meeting with Minister for Agriculture
Chief Secretary, Development
Commissioner, Secretary Agriculture,
Director of Agriculture and
Registrar Co-operatives Societies.

Leave Chandigarh for Panjore Gardens
2.30 P.M. and come back in the evening

Tuesday 3.2.59.

Dep. Chandigarh 9.0 A.M.
Arr. Gangewal Power House &
then Nangal Dam.

Lunch at Nangal Township

Dep. Nangal 3.0 P.M.
Township
Arr. Bhakra Dam 3.30 P.M.

Inspection of Bhakra Dam.

Dep. Bhakra Dam 5.0 P.M.
Arr. Chandigarh 7.0 P.M.

Wednesday 4.2.59.

Inspection of Bhakra Dam.
Dep. Chandigarh 9.0 A.M.
Arr. Ludhiana 1.30 P.M.

(Inspection of work en-route
will be as under:-)

10.30 A.M. Reception at Kehara
10.45 A.M. Farm of Kishen Singh, Jandiali
Dairy Farm.
11.15 A.M. Artificial Insemination Centre
Sahnawal.
11.30 A.M. Youth Club & Poultry Farm Nandpur.
11.45 A.M. Jugiana Gardens Colony:

- a) Chitra Model Farm;
- b) Dairy Farm;
- c) Youth Club Project;
- d) Grewal Poultry Farm;
- e) Labh Singh Model Farm;
- f) Meeting with progressive farmers of the Colony.

Tea at Ludhiana. 3.0 P.M.

District Level Fertilizer Workshop
Visit to Agricultural College:

- (a) Round of College building;
- (b) Youth Club Training Camp; and with Agricultural Production.
- (c) Meeting with Specialists concerned with Agricultural Production.

Departure for Chandigarh.

5.0 P.M.

Dep. Chandigarh 9.0 A.M.

Arr. Delhi. 1.0 P.M.

Thursday 5.2.59.

KELLO66
9/2/59
III

DEVELOPMENT OF AGRICULTURE
IN THE PUNJAB. **

Agriculture plays a dominant role in the life and economy of the State. Out of a total population of 16 million, 13 million reside in the villages, and nearly 11 million (66 per cent) are directly engaged in agriculture. The total area of the State (1956-57) is 30.3 million acres, which, according to broad uses, is distributed as follows : -

		<u>Million acres.</u>
1.	Area under forests.	1.0
2.	<u>Not available for cultivation.</u>	
	Land put to non-agricultural uses.	1.6)
	Barren and uncultivated land.	6.2)
		7.8
3.	<u>Other uncultivated land excluding fallow land.</u>	
	Permanent pastures and other grazing lands.	0.3)
	Culturable waste land.	1.8)
		2.1
4.	Fallow lands.	1.3
5.	Net area sown.	18.1
	Total ...	<u>30.3</u>

The total cultivated area (net area sown plus fallow) is 19.4 million acres, the total cropped area, 23.9 million acres, and cropping intensity, 122 per cent. An area of nearly 5.8 million acres is sown more than once in a year. The total net area irrigated (1955-56) was 8.1 million acres, which formed nearly 42 per cent of the total area cultivated. Canals accounted for about two-third of the irrigated area, and wells for about one-third.

The State enjoys a variety of soil and climatic conditions, suited to the growth of a large number of crops and fruit plants, and holds the tradition of being the granary of India. The main crops grown are wheat, gram, barley, maize, bajra, jowar and rice among the foodgrains, and cotton, sugarcane and oilseeds among the cash crops. The average per acre yields of wheat and cotton are the highest in the country as well as that of maize in most of the years, except when it suffers from some natural calamities.

** By -

Dr. Arjan Singh, Ph.D(Wales),
Director of Agriculture, Punjab,
Chandigarh.

...the growth of a large number of crops and fruits ...
...The state enjoys a variety of soil and climate ...
...Cereals accounted for about one-third of the ...
...as 8.1 million acres, which formed nearly 42 per cent of ...
...a, sown more than one crop. The total net area ...
...Director of Agriculture, Punjab, ...
...in area of nearly 6.8 million ...
...the total cropped area, 22.2 million ...
...The total cultivated area thus area now ...
...Total ...

The partition of the country was a great set-back to the Punjab, so far as its agriculture is concerned. The fertile canal colonies were left in the West Pakistan. The over-all production showed a deficit, and nearly 37,000 tons of foodgrains had to be imported from outside. In 1948-49 the production of the various agricultural commodities stood at the following levels : -

		<u>Million tons.</u>
Foodgrains	..	3.247
Sugarcane (raw sugar)	..	0.404
Oilseeds.	..	0.090
Cotton.	..	0.139 (million bales)

The years that followed, however, changed the situation from one of scarcity to that of surplus. This was the result of cooperation and ingenuity of the farming community to adopt improved techniques of farming, and Government help in terms of money, men and material.

During the First Five-Year Plan, development of agriculture was given a prominent place, as this was essential for the economic progress of the country. Out of the total outlay of Rs. 147.25 crores, provided in the public sector, Rs. 25.53 crores were provided for agricultural and rural development, including Minor irrigation works, Community projects, Animal Husbandry, Forests, Cooperation, Consolidation, Fisheries and Game Preservation, while Rs. 7.71 crores outlay was proposed for major and medium irrigation, which has a direct bearing on agricultural production. In addition, Rs. 68.8 crores were provided for Bhakra-Nangal and Harike projects. Special stress was laid on the production of foodgrains and commercial crops like cotton, sugarcane and oilseeds. The targets laid down in the First Five-Year Plan together with achievements were as under:

Commodity	Production in 1948-49	Production in the base year 1955-56	Targetted production in 1955-56	Actual production in 1955-56	Percentage increase over 1950-51
Foodgrains (000' tons)	3,247	3,245	3,894	4,501	39
Cotton (000' bales)	139	371*	601	735*	98
Sugarcane (raw sugar) (000' tons)	404	440	517	557	27
Oilseeds (000' tons)	90	109	115	149	37

From the above table, it will be seen that the production of

foodgrains increased by 39 per cent, to reach 4.5 million tons in 1955-56. There was spectacular progress in the production of cotton. From 0.37 million bales in 1950-51, its production rose to 0.74 million bales in 1955-56, an increase of 98 per cent. The sugarcane and oilseed production was higher than that in the base year by 27 and 37 per cent respectively.

Prosperity and advancement in agricultue is also evident from the increase in the number of implements and machines used in this profession. The following table shows the number of ploughs, carts, sugarcane crushers, oil engines, electric pumps and tractors for the year 1951 and 1956, and the percentage increase in each case -

Implements	Number		Percentage increase.
	1951	1956	
1. Ploughs			
(a) Wooden	12,58,750	15,74,557	25
(b) Iron	1,63,201	2,80,398	72
2. Carts.	3,88,699	4,68,161	20
3. <u>Sugarcane crushers.</u>			
(a) Power-driven.	529	606	15
(b) Bullock-driven.	66,641	78,134	17
4. Oil engines.	1,648	5,057	207
5. Electric pumps.	325	6,839	2,004
6. Tractors.	1,392	3,809	174

Second Five-Year Plan. The Second Five-Year Plan, still underway, aims at diversification and imparting further stability to agriculture in this State. Out of the total outlay of Rs. 163.33 crores, Rs. 30.72 crores have been provided for agriculture, including consolidation, minor irrigation works, animal husbandry, forests, fisheries, community development and National Extension Service, cooperation, panchayats, etc., and Rs. 13.16 crores for major and medium irrigation projects, and Rs. 45.08 crores for Bhakra-Nangal projects. In the development of agriculture, Punjab's responsibilities for the achievement of National objectives are substantial. The additonal targets fixed to be achieved by 1960-61 are :-

	Million tons.
Foodgrains	1.440
Sugarcane (raw sugar)	0.223
Oilseeds	0.036
Cotton.	0.515 (million bales)

In terms of overall gains in production, the State has to reach the targets of 5.94 (million tons of foodgrains, 1.25 million bales of cotton (trade figures), 0.78 million tons of sugarcane (raw sugar) and 0.185 million tons of oilseeds. Compared with the production of 1955-56, the targets for 1960-61 represent an increase of nearly 32 per cent in foodgrains, 70 per cent in cotton, 40 per cent in sugarcane and 24 per cent in oilseeds.

On the basis of our past accomplishments, there is every hope of the success of the programme during the Second Five-Year Plan. An indication of this is available from the production records of the first three years of this Plan, shown below :-

Commodity:Units:	Base year 1955-56	Level of pro- duction to be reached by 1960-61	P r o d u c t i o n		
			1956-57:	1957-58:	1958-59:
Foodgrains .000'	4501	5,941	5,550	5,433	5,589**
tons.					
Cotton .000'	735*	1,250*	825*	900**	746
bales.					
Sugarcane .000	557	780	539	674	705
(raw sugar) tons.					
Oilseeds .000	149	185	159	170	182
tons.					

** Excessive rains and floods in September-October, 1958 caused heavy damage to maize, jowar and cotton. They, however, proved beneficial for the extensive sowings of wheat, gram and barley.

Ⓐ Provisional figures including estimated production for wheat, barley and gram.

ix Trade estimates.

During the year 1956-57, the first year of the Second Five-Year Plan, foodgrain production recorded sharp increase and touched the new peak of over 5 1/2 million tons. This level has been, more or less, maintained in the following two years, inspite of heavy damage to crops by excessive rains and floods. The production of sugarcane after registering a shortfall in 1956-57, has increased to over 0.7 million tons. The production of oilseeds has steadily increased, and, during the current year, it has reached almost the target figure of 1960-61.

Assessment of the Achievement: In spite of unfavourable seasons, low productivity of our lands and numerous other difficulties, the achievement is, indeed, remarkable, and there is every reason to be proud of this record. Credit for such remarkable results could be

attributed to the joint efforts of the Government and sturdy peasantry. The measures for increasing agricultural production include expansion of irrigation facilities through major, medium and minor irrigation works, greater use of fertilizers and manures, improved seeds, introduction of better and intensive cultivation methods, protection of crops from insect pests and diseases, land reclamation and drainage.

Irrigation facilities :- In 1950-51, the net total irrigated area from all sources in the Punjab State was 6.403 million acres. By the end of First Five-Year Plan, i.e. in 1955-56, it rose to 8.062 million acres. Thus, the additional area brought under irrigation during this period was 1.659 million acres. Of this, 1.285 million acres was accounted for by the canals, and the rest nearly 0.4 million acres by wells. The minor irrigation works include percolation wells, pumping sets, and tubewells, which play a significant role in the economy of this State. Accordingly, substantial financial assistance is provided every year in the budgets of the Agriculture and Development Department (C.D.) for advancing loans to the cultivators for this purpose.

Fertilizers and Manures:: The consumption of nitrogenous fertilizers in this State has been steadily increasing. From as low as a figure as 4,000 tons in 1952-53, it touched the level of 36,000 tons in 1957-58. The final target by the end of Second Five-Year Plan is 1,55,000 tons. During the current year, arrangements have been made to distributed the following quantities of fertilizers:-

	<u>Tons.</u>
Ammonium sulphate ..	18,000
Calcium ammonium nitrate..	20,000
Ammonium sulphate nitrate..	5,250
Urea. ..	5,250
	<u>48,500</u>

The phosphatic fertilizers have not become popular with the cultivators of this State, because of their high price and slow action. To increase their consumption, efforts are being made to distribute them in the form of mixtures with ammonium sulphate. On the basis of total cropped area of 2.39 million

acres and the level of consumption of fertilizers at 40,000 tons, the nitrogenous dose works out to only 0.3 lb. per acre. The application of fertilizers, therefore, offers the greatest scope for increasing agricultural production in this State. As a result of experimental work done by the State Agriculture Department and the fertilizer trials conducted all over the country in representative soils under the Indo-American Technical programme, it has been observed that a dose of 20 lbs. of nitrogen and 20 lbs. P_2O_5 per acre on the phosphatic responsive soils gives economic return, when applied to paddy and wheat crops. In these trials, the average additional yield of paddy for doses of 20 lbs. and 40 lbs. nitrogen was 4.5 and 6.6 maunds per acre respectively. In similar trials, the average yield of wheat for 20 lbs. and 40 lbs. nitrogen was 3 and 4.7 maunds per acre, respectively. These results are of great significance and indicate the scope of increasing crop yields by the application of these fertilizers.

Since considerably shortage of chemical fertilizers is expected to be experienced in the coming few years due to foreign exchange difficulties, stress is being laid on the development of local manurial resources like green-manuring, composting, growing of leguminous crops and proper rotations, etc. Towards the end of First Five-Year Plan, the total area green-manured was 40,000 acres. It rose to 90,000 acres in 1957-58. The target for the current year is 2,00,000 acres, and by the end of 1960-61, an area of 3,50,000 acres is to be covered. While on large-sized canal-irrigated holdings, green-manuring is becoming popular, on farms, which are either irrigated by wells or are dependent on somewhat limited rainfall, this practice has not gained ground. To a small extent, this Department distributes seeds of green-manuring crops on 50 per cent subsidy basis, but the quantity distributed is extremely small, and the concession is also likely to be misused by unscrupulous persons. Under these circumstances, efforts are being made to popularize Jantar or Danicha (*Sesbania*) as a border crop, so that it will provide fuel as well as green-manure. Green-manuring of rice with Jantar has been found to be highly profitable and is being popularized

actively. Great stress is also laid on the growing of leguminous crops like cluster bean (gowara) and clovers (berseem senji etc.) in rotation of crops.

Composting:- Composting of town refuse and village waste material is one of the important activities of development. Since partition, a good deal of success has been achieved, and now about 2,00,000 tons of compost is prepared in towns, and over 5,500,000 tons in villages, where a large number of pits have been dug. A new scheme known as "Development of Local Manurial Resources" has also been taken up, under which whole-time Compost Inspectors have been appointed in 34 National Extension Service blocks, for devoting special attention to this work. It is also intended to encourage the composting of night soils in some of the selected villages.

Improved seeds:- The use of improved seeds is undoubtedly an important factor in increasing agricultural production. The requirements of improved seeds are being met in two ways: firstly, by setting up a chain of seed farms on the basis of a 25-acre seed farm for each National Extension Service Block, and secondly, by systematic multiplication of seeds through registered growers.

During the Second Five-Year Plan, it is proposed to set up 228 seed farms. So far, 76 farms have been established, and it is proposed to add 52 farms by the end of this year. The remaining farms will be established in the next two years of the Plan. In addition to the programme of setting up seed farms, the Department of Agriculture has framed and put into operation a plan of seed multiplication and distribution through registered growers. This scheme involves four steps:

- (i) Production of nucleus seed by the plant breeders;
- (ii) Production of foundation stock at Government farms;
- (iii) Multiplication of seed through 'A' class registered growers at district and block level; and
- (iv) Multiplication of seed through 'B' class registered growers at village level.

This arrangement is being systematised in a manner, which will ensure flow of fresh seed to all the cultivators in rotation.

The system of seed multiplication and distribution varies greatly with the nature of the crop. In crops like wheat and rice, for which self-fertilization is the rule, it is comparatively easy

to maintain the purity of seed for a long period, especially if it possesses the characteristics, which enable it to be easily distinguished in the field. Cotton, maize and millets, on the other hand, are crops, in which cross-fertilization is very common, and if it occurs, it nullifies the work of the plant breeder. Cotton has also another problem, for in addition to cross-fertilization, centralized ginning results in the mixing of seed of different types. Special measures have, therefore, to be devised to overcome this handicap. Although the stages involved in this case are the same, as mentioned above, yet the work is more centralised, so that it is possible to rogue the fields of the cultivators effectively and gin the seed cotton (kapas) under careful departmental supervision. In regard to maize, hybrid seed is being developed in cooperation with some progressive growers. The entire work of supply of improved seeds is handled by the Department of Agriculture in collaboration with the Cooperative Department. Unlike foreign countries, there are no private agencies in this State, which deal in improved seeds.

Introduction of Improved Agricultural Practices: Improved agricultural practices are also one of the means for increasing production. A beginning has already been made with Japanese Method of Paddy Cultivation and Crop Competition. Paddy crop sown according to Japanese Methods covered 1,73,764 acres in 1957-58 as against 99,186 and 1,53,112 acres in 1955-56 and 1956-57, respectively. The target fixed for 1958-59 is 2,81,250 acres and by the end of the Second Plan period, it is proposed to reach the level of 3,50,000 acres.

Plant Protection Measures:- During recent years, the problem of plant protection has assumed great importance. Statistics of work done during 1956-57 and 1957-58, and the targets to be achieved in 1958-59 are given below :-

Item	: Achievement : Achievement : Targets :		
	: 1956-57	: 1957-58	: 1958-59 :
1. Area baited against field rats.	3.45 (million acres)	3.86 (million acres)	3.50 (million acres)
2. Area baited against jackals.	15,000 acres.	20,684 acres	29,000 acres.
3. Fruit trees sprayed.	3,22,000 acres.	3,12,219	1,80,000
4. Area cleared of pests.	87,000 acres.	51,462 acres	23,000 acres.

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Introduction of Improved Agricultural Practices: Improved

Agricultural practices are also one of the means for increasing
production. A beginning has already been made with Japanese Method
of Paddy Cultivation and Green Composting. Paddy crop soon according
to Japanese Method covered 1,73,761 acres in 1954-55 and 1955-56
99,156 and 1,55,112 acres in 1955-56 and 1956-57, respectively. The
target fixed for 1955-56 is 2,51,700 acres and by the end of the
second plan period, it is proposed to reach the level of 5,50,000 acres.
Plant Protection Programme: During recent years, the
problem of plant protection has assumed great importance. Specialists
of work done during 1955-57 and 1957-58, and the targets to be achieved
in 1958-59 are given below:

Item	1955-57	1957-58	1958-59
Area treated against Field	3.45	3.88	5.30
Area treated against Insects	15,000 acres	20,000 acres	25,000 acres
Fruit trees sprayed	3,25,000	3,12,212	1,30,000
Area cleared of pests	57,000 acres	51,482 acres	55,000 acres

Though regular campaigns are carried out to fight the menace, yet it is unthinkable to tackle the problem through the Department alone with its limited staff and resources. Farmers will have to find their own resources, sooner or later, to equip themselves properly for plant protection measures under the technical advice of the expert staff. Considering the magnitude and importance of the problem, provision has, however, been made in the budget for 1958-59 for strengthening the existing departmental organization and for the supply of pest control equipment on subsidised basis to Panchayats, Better Farming Societies and owners of model farms.

Land Reclamation:— One of the most important methods of increasing agricultural production in this State is that of bringing under the plough, the culturable waste lands, which have hitherto been lying uncultivated. In the year 1949-50, the unculturable waste, excluding fallow land, in this State was 3.5 million acres. In 1956-57, it was 2.1 million acres. Thus, in 8 years, nearly 1.4 million acres were brought under the plough. This was mostly done by the individual cultivators through their own efforts. Under the Land Reclamation Schemes of the Department of Agriculture, about 1,40,000 acres were reclaimed. Under the scheme, now in operation, the Government has entered into contract with the private firms for reclamation of waste lands.

Land Drainage:— Canal irrigation, which has played an important part in stepping up production, is not an unmixed blessing, and brought in its wake the problem of water-logging and salt infestation. Besides, this State has also been experiencing high floods, especially in the years 1955 and 1956, resulting in accumulation of rain-water along the canals, their distributaries, roads, railway lines, etc., due to defective drainage. A comprehensive survey carried out in 1956 indicated that the water-table was 0.5 feet in 3.3 million acres and 5-10 feet in 3.8 million acres. These figures are really alarming and almost total up to the figures of irrigated areas. The problem is being tackled by digging a network of drains in water-logged areas and taking steps for the control of floods, such as construction of flood embankments, training of rivers, coupled with long-term measures for afforestation of hills and construction of dams and check dams in the

catchment areas of rivers. The rough estimate of anti-water logging and anti-flood measures work out to about Rs. 13.84 crores, and schemes costing about Rs. .9 crores have been drawn up. Some of these schemes have been put into operation. Lining of canals, sinking of shallow tubewells, percolation wells are the other means, which can help in lowering the water-table. Schemes for these are also being worked out. Salt-affected areas can be reclaimed by washing down of surface salts. Provision of Irrigation water for the washing of these salts has to be combined with the digging of drains.

Horticulture:- A number of schemes have been taken up for the development of horticulture. These include grant of loans for planting orchards and setting up small-scale canning units and establishment of nurseries for the production of fruit plants. It is proposed to increase the acreage under fruit trees from 53,000 in 1955-56 to 75,000 by 1960-61. In 1957-58, Rs. 1.066 millions were advanced as loans to farmers for planting orchards. In the current year, Rs. 0.9 million have been provided for this purpose. The annual production of fruit plants has already touched the level of 2,25,000 plants.

RESEARCH::

Besides development, research and education are receiving considerable attention. Agriculture being the most important industry of the Punjab, research work in agriculture was organized in this State on fairly advanced lines, quite early. The partition of the State, however, hit the research work very severely, because the Government Agricultural College and Research Institute at Lyallpur were left in West Pakistan, alongwith a good deal of research material. The importance of organizing research anew on modern lines was realized immediately after the partition, and within a few years, plans were formulated for setting up a Research Institute alongwith the Agricultural College at Ludhiana. A part of the main building of this Institute has been completed, and the College has now occupied it. The research sections, which are, at present, located at different places in the State, will be shifted to this place, as soon as further facilities are available.

In spite of innumerable handicaps and lack of adequate facilities, a good deal of research work has been carried out, and the results of practical value obtained. Special mention must be made of the remarkable success achieved in the evolution of new varieties of cotton. With the partition of the State, all the medium and ~~long-staple~~ cottons growing in the canal irrigated areas were left in West Pakistan; the Punjab (India) receiving only 3.5 per cent of the area under this category of cotton. Further, no suitable variety of long-linted cotton was available. Attention was, therefore, paid to evolve suitable varieties of acclimatised cotton, and 3 improved varieties, viz., 320F, 216F and H.14 were evolved, which now cover more than a million acres of area. All these varieties are early in maturity and give good yield. Punjab American 320F possesses wonderful adaptability to a wide range of agro-climatic conditions in the central and even sub-montaneous districts of the State. H. 14, which is a selection from 216F, is a heavy yielder and matures earlier than the mother strain. It is more resistant to Jassid. The following table gives an idea of the fibre properties and the ginning percentage of the cottons brought out since partition:-

Varieties	Mean fibre : length (inches)	H.S.W. : counts*	Ginning : percentage	Maturing : period
1. Desi (standard)	0.60	6	35.0	Early to medium
2. L.S.S.	0.88	32	33.3	Late.
3. 216F.	0.93	34	33.4	Early.
4. 320F.	0.92	37	34.0	Early.
5. H. 14	0.95	39	35.4	Very early.

* One count 500 yards of yarn. The numbers indicate the number of standard counts (of 500 yards of yarn each) that can be spun out of one lb. of lint. The higher the number of counts, the finer the yarn that a cotton would yield. The length of fibre and the fineness of yard go together, i.e., the longer the fibre the finer the yarn that can be spun out of it.

Further breeding work is in progress in order to evolve a better strain with regard to yield as well as fibre quality. Particular attention is being paid to develop strains with staple

length of $1\frac{1}{8}$ inches. A large number of crosses of Punjab cottons and strains of other States and countries including Egypt and Sudan, are under study at Abohar and Hansi. The fibre properties of some of these are shown in the following table :-

Strains	Mean fibre : length * (inches)	H.S.W. : counts	Ginning : percentage	Maturity : period
1. 320F (Standard)	0.92	37	33.8	Early.
2. LL.53	1.10	51	34.1	Early.
3. LL.54	1.07	50	36.0	Early.
4. LL.55	1.11	52	33.8	Medium
5. LL.56	1.08	56	32.8	Late.
6. LL.57	1.13	54	34.5	Medium.

* Some varieties under experimentation possess a fibre length of as much as 1.2 inches.

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Evidently, the new strains possess much longer and finer staple than the existing improved varieties. In addition, they possess higher ginning percentage and are early to medium in maturity. Most of them are also as good or slightly better than the existing varieties, so far as yield is concerned. Some of them have been liked very much by the cultivators, when tried on their fields and there is great demand for their seed. Due to its superior fibre qualities, the LL.54 seed cotton fetched over Rs. 60 per maund in the Abohar market as compared to Rs. 31-32 per maund of L33 and 320F. It has been estimated that a cultivator could easily secure an additional income of over Rs. 50 per acre, if he switches on to the cultivation of LL. 54 in place of 320F. India is still short of its requirements with regard to long staple cotton and Punjab offers a great scope for producing such cottons. It is hoped that within a short period, it will be possible to produce bulk of the long-linted cotton.

The Department is also evolving improved strains of indigenous cotton (Desi), which surpass the old varieties, both in respect of out-turn and ginning percentage. A new variety

D.C. 109 holds out a great promise, because of its high yield, ginning out-turn and spinning capacity. Its length of lint is about the same as that of 320F.

Wheat is the most important crop of this State. Considerable research has been carried out on this crop. Since partition a number of new strains have been evolved, the most important of which worth-mentioning are :-

C. 281 : - It has gained firm ground in the Hariana tract on account of its early maturing habit and bolder grains.

C. 273 : - It is another strain, which possesses very attractive and high-quality grain. It has given a good account of itself against C.518 as well as C.591, the varieties previously recommended. It is more resistant to Yellow rust and Loose smut, as compared to the ^{varieties} ~~varieties~~ already grown. Similarly, a number of other varieties have been evolved, suited for different agro-climatic conditions.

Another outstanding achievement that has been made, is the introduction of Hybrid maize seed. Research work on the adoption of this system is of recent origin; the start having been made in April, 1955. There are now a number of double and single cross hybrids, which are under study. The results are very encouraging. as these hybrids have given 2-3 times the yield of local. During the current year, about 2,500 maunds of hybrid seed has been ^{produced} ~~purchased~~ for distribution amongst private cultivators.

Side by side with the above, work has also been started for evolving crosses between the United States dent corn and Punjab flint corn, and some interesting results have already been secured.

Rice is yet another crop, in which a few new varieties are very promising. Three Chinese varieties have been found to do very well, both on research stations and cultivators fields. They are very early maturing as well as drought resistant, and some of them are likely to make it possible to raise two crops of rice during the course of a year.

A number of improved varieties in respect of practically all the crops, that are being grown in this State, have been evolved.

In addition to Plant Breeding sections, which are carrying on work on the evolution of improved varieties and on agronomic conditions for different crops, Plant Pathological and Entomological Sections are carrying on valuable research on the control of plant diseases and insect pests. The Chemical Section is doing research on soil deficiencies, soil fertility, fertility maintenance and manurial requirements of crops.

EDUCATION:

Agricultural education is one of the most essential and important activities of the Department. Apart from the need of trained personnel for the Department, practical farmers are also interested in obtaining upto-date knowledge of the craft, in which they are engaged. With the partition of the State in 1947, agricultural education in this State received a severe set-back, because the renowned Punjab Agricultural College and Research Institute at Lyallpur were left in West Pakistan, and there was no teaching Institution in the new Punjab. The students at the Punjab Agricultural College, Lyallpur, who migrated to India, had to continue their studies in rented buildings, with inadequate laboratory facilities etc., for over a decade, and it is only recently that the College classes have been shifted to the permanent buildings at Ludhiana, which is still under construction. When fully established, this Institute will have about 660 acres of farm land, teaching accommodation for 400 Graduate and 80 Post-Graduate students and hostel accommodation for 480 students, besides having accommodation to house the main activities of all the main research sections. At present, about 80 students are admitted in the first year class, every year. Their number is being raised to 100 from the next year, in order to make up the shortage of trained personnel. With the centralisation of Agricultural College and Research Institute, it will be possible to integrate research, teaching and extension - so very necessary for rapid improvement of agriculture.

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TOUR ITINERARY
OF
FORD FOUNDATION TEAM ON AGRICULTURAL PRODUCTION

Ludhiana C.D. Block and Government Agricultural College
February 4, 1959

- 10.30 A.M. Arrive Kohara Rest House
Meet with Prof. R.E. Cray, Poultry Technician
Bishan Singh, Professor of Extension
Kharak Singh, Agricultural Development Officer
G.D. Pawar, Rural Sociologist.
Raghubir Singh, Lecturer in Evaluation
Jaswant Singh, Extension Officer (Agriculture) {present me.
- 10.30 - 11.15 Kohara
Meet with S.Arjan Singh Sarpanch Village Kohara. Glimpse of the pattern of farming and village life at Kohara - a typical Punjab Village.
- 11.25 - 11.40 Jandiali
Meet with S.Kishan Singh Study dairy enterprise.
- 11.50 - 12.05 Nandpur
Meet with S.Dharamjit Singh Youth Club.
- 12.20 - 12.30 Jogiana
Round of the Garden Colony
- 12.30 P.M. Reach Chitra Multipurpose Cooperative Farm.
Meet with Capt. Rattan Singh, a progressive farmer and chairman, Block Planning Advisory Committee.
- 12.30 - 2.00 Hold discussions with Planning Advisory Committee leaders and progressive farmers of Ludhiana Block and
- Lunch.
- 2.30 P.M. Reach Govt. Agricultural College, Ludhiana.
- 2.30 - 4.30 Hold discussions with subject matter specialists of State Department of Agriculture,
Chairman - Dr. Arjan Singh, D.D.I.
and
Tea.
- 4.30 - 5.00 Round of College buildings.
- 5.00 P.M. Departure for Chandigarh.

KOHARA - a typical Punjab Village

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KOHARA is one among 21516 villages inhabited by 13 million odd rural population of Punjab and in a broad sense it presents the typical pattern of farming and village life in the State.

Situated on Ludhiana Chandigarh road at a distance of 10 miles from Ludhiana, this village has a total population of 1209.

Farming families				Non-farming families				
82				69				
Self cultivating	Share Croppers	Tenant	Absentee Landlords	Potters	Shop - keepers	Labour	Black smiths and Carpen- ters	Shoe Makers
42	37	1	2	28	2	31	3	5
				28	2	31	3	5
Total area : 923 acres								
Cultivated	Culturable waste	Unculturable waste						
825	None	100						

Land of the village is consolidated which has made it possible to piece together scattered bits of individual holdings in solid blocks - a necessary precondition for any permanent improvement in farming standards. A large percentage of villages in the State are yet unconsolidated. Average holding in Kohara is 12 acres which requires an intensive type of farming. In many other areas, the holdings are even smaller and thus pose a different ground for farm planning research as compared with situation in countries where holdings are large.

The extent of irrigated area in this village is less than 50%, principal sources being two Government tubewells, 1 pumping set and 40 percolation wells individually as well as commonly owned. Scope of increase in production through mere ample irrigation is evident. Main crops grown are wheat, Gram, Maize, Cotton, Groundnuts, Sugarcane and Fodder with average per acre yields of wheat 16 maunds, Maize 12 maunds, and Cotton 7-10 maunds. The technique of farming is tending to be progressive with farmers becoming more conscious of the use of fertilizers, good seed etc. The low level of crop yields, however, yet leaves a long distance to reach the goal of farming for high production with sound management practices, scientific use of fertilizers on the basis of actual soil and crop needs, plant protection, measures and better crop varieties. The village has a common foot spray pump supplied by Government on subsidy because every farmer cannot afford it.

Compost is a potential source for the supply of organic manure to farm land. In Kohara there are 160 compost pits at 6 places in pieces of land made available after consolidation. In villages where there is no consolidation, there is no land for manure pits and the rubbish keeps lying in scattered heaps. Besides, cattle dung which is the chief constituent of good compost is generally burnt as dung cakes to meet fuel requirements of the households.

Village life.

The village has a main entrance gate with small pucca sitting platforms inside and streets running in different directions.

Sitting place near the gate is the principal informal centre where the people commonly chat, give a true expression of their feelings, opinions and reactions to everything that goes in the village and the world outside. The Community owned radio set is also fixed at this place for people to listen to

selected broadcasts at their leisure hours. Kohara has all paved streets with pucca drains which activity is one among many to reflect their common urge for better living. A large number of villages present a contrast with katcha streets and poor drainage so that they are always muddy and stinky. About 50% of the houses in this village are pucca whereas in others they are just mud wall structures and would collapse in monsoons with heavy showers. Practically every house hold has a hand pump for drinking water supplies. Bath taking with cold water in the morning whether in summer or winter is more of a habit. A pond in the vicinity of the village is used by buffaloes for keeping themselves cool in summer.

The village is fortunate to be ready to receive electric supply in a short time period and this will make a big change both in farming and home life. The number of tubewells will increase.

The village is running a Primary as well as High School with the patronage of village panchayat. High School is a purely Village financed project, With 175 students. The primary school has co-education and number of boys and girls on roll is 125.

The village has a strong panchayat to manage village affairs with an influential and intelligent Sarpanch. Also there is one women organization and a Youth Club on 4-H pattern.

Important Cottage industries are pottery, pakhli weaving for cartsmen, Button making machine. Pakhli making is a whole family enterprise where every member helps in the different operations of drying, spinning and weaving. Two men make one Pakhli in two days. As regards Button making machine, one individual is engaged. The whole machine sells for Rs.17/- and is used by tailors. The life of the machine being very long, the demand is not recurring.

A typical farm household

S. Ajit Singh (Headman)

Joint Family (3 brothers, one dead)

The total members of the family are 13. (2 brothers, 2 wives, 6 boys, 3 girls). Land owned by the family is 23 acres out of which 10 acres are good cultivated while the rest 13 are sandy unlevelled giving only one crop of groundnuts. On the 10 acre piece of land the current crops are 7 acres wheat, 3 acres gram and fodder. In Kharif season, this farmer grows 2 acres maize, 2 acres American Cotton, $\frac{1}{2}$ acre short staple cotton, $\frac{1}{2}$ acre sugarcane, and 2 acres fodder. The means of irrigation is a percolation well.

The livestock owned includes 3 bullocks, 2 buffaloes, 1 cow, 1 camel and 1 buff calf. The milk yields are 8 seers per day for buffalo and 6 seers for cow.

Crop yields conform the averages for the village. No fertilizer was purchased and put to the crop despite its availability on loan because a lot of money was drained away by a marriage in the family.

The house has 3 rooms, one kitchen, one courtyard, one fodder shed and 2 separate cattle rooms for summer and winter. In many households there is no separate cattle room. The whole family sleeps in 2 rooms on cots. One member sleeps in cattle room. The produce is also stored in the same rooms. There is a small kitchen garden also attached to the house where vegetables are grown for home consumption.

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DAIRY FARM OF S. KISHEN SINGH, JANDIALI

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- I. S. Kishen Singh's Dairy Farm was started in the year 1954 with six buffaloes purchased for Rs.3,000/-, the enterprise has expanded to :

27 Murrah Buffaloes
1 Cow
1 Bull
13 Calves

II. MILK YIELD

Out of 27 buffaloes, 9 are dry and the other 18 yield 4 mds. of milk daily which is transported to Ludhiana on Bicycle and sold @ Rs 16/- to 20/- per maund. The highest milk yielder gives 40 pounds of milk per day. Average lactation is one year and the average dry period is 3 months. Calvings are regulated so that maximum milk yield is during the summer months when prices of milk are higher and feeds are cheaper.

III. FEEDS AND FODDER SUPPLY

Buffaloes are fed the following ration :

1. Chhilka	50%
2. Sarson cake	25%
3. Gram	25%

Four pounds of ration is fed to each dry animal daily. The milking animals are fed one pound of concentrates for every two pounds of milk.
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Green fodder/supplied by raising fodder crops like berseem, maize, chari and bajra on the 45 acre farm. Area put under fodders annually is 7 acres in winter and 20 acres in summer.

The average annual expenditure on medicines is about Rs.300/-.

IV. MANAGEMENT.

The total number of persons employed in the Dairy is six, out of which 3 are employed at Rs.400/- per annum per head. They also get free meals and clothing. The other three are members of the family.

There are two cattle sheds with pucca floor and drains to collect urine which is used as manure.

V. GENERAL

The dairy gives about 400 tons of Farm Yard manure annually, which is applied to crops. As a result, the yield of crops is very high. Average outturn of wheat per acre is about 45 Mds. while that of maize is 40 mds. (1 md.= 82 lbs.)

VI. Difficulties:

- (1) Rise in cost of feeds: Increase in the prices of gram from Rs.10/- to Rs.23/-, cotton seed from Rs.10/- to Rs.15/- and wheat Bhusa from Rs.1/8/- to Rs.3/- per md., without any rise in the prices of milk, has left very little margin in the enterprise as a commercial venture.
- (2) Cows of Sahiwal breed are not available.
- (3) Marketing of milk is a problem. For want of suitable transport, milk has to be carried to Ludhiana on bicycles over a distance of twelve miles, every morning and evening at very inconvenient hours.

NANDPUR - Youth Club

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The club was organised in 1957 on the 4-H pattern with a membership of 20.

PROJECTS.

Poultry Keeping is one of the major projects of the members. There are nine members running a joint poultry project of 400 birds of approved types. This project was started with chicks one week old and includes both W.L.H & R.I.R. The birds are kept in a nice poultry house under hygienic conditions. Great difficulty is being experienced due to non-availability of fish meal. Hence the daily diet excludes this. Other three members have also taken up poultry projects but they run them individually. Four members have taken up Hybrid Maize as their projects.

SPORTS.

The club participated in the 'Youth Club Tournament', held at Government Agricultural College, Ludhiana and won a prize in Kabbadi. The club members have got Kabbadi and Volley Ball as their regular games.

TRAINING.

Some members of the club attended the training camps sponsored by the Block and proving very helpful in carrying out the Developmental activities in that area.

PRESIDENT.

The president of the Club, Shri Dharmjit Singh is a very progressive farmer. He is doing the farming himself, practising modern techniques throughout. His voluntary leadership has been a source of inspiration to other members. He competed in the C.D. Block Model Farms' Competition and won third prize.

FINANCE.

This programme of Youth Organization is being financed out of the Budget of the C.D. Block, Ludhiana.

This club has been given an aid of Rs.100/- against a matching contribution by the club members.

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COOPERATIVE GARDEN COLONY, JOGIANA KANGANWAL

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Facts & Figures

-oOo-

I. INTRODUCTION

The Jogiana Cooperative Garden Colony Society Ltd. was formed on 9th March, 1950 with the 35 displaced families from West Pakistan as its members. The possession of the land measuring 607 standard acres was taken in May, 1951. The land was sandy loam and at that time was heavily infested with weeds, uneven and dotted with small ponds, and sand dunes. The land was consolidated immediately and 35 plots were created which were distributed among the members by drawing lots. Each plot has a horticulture block of 14 acres most of which is being put into Malta-oranges. Much hard work was put into levelling up the land to make it fit for farming. The first allottees to shift to the Colony were General Mohan Singh and Captain Rattan Singh who pitched their tents in April, 1951. The rest of the families settled in 1953.

II. IRRIGATION

The land is served with canal irrigation, but the canal does not supply enough water. Irrigation is mainly from 32 tubewells and pumping sets installed by members with a loan of Rs.50,000/- from the Government.

III. MECHANISATION OF AGRICULTURE

Bullock cultivation is yielding place to tractor cultivation. Already there are 13 tractors in the colony. Government has advanced members of the Colony a loan of Rs.8,000/- for the purchase of implements and other equipment.

IV. CROPPING.

In addition to oranges, crops like wheat, cotton, maize, vegetables and fodders are grown. The Society has decided to specialise in seed production, including wheat, vegetable and Hybrid Maize.

This year the Colony has produced 1600 mds. of hybrid maize seed (Illinois 1656) on 95 acres of land. This is nearly two thirds of the total hybrid maize seed produced in the State.

The members were encouraged in this venture by the experience of Capt. Rattan Singh, the Secretary of the Society who successfully raised hybrid maize seed crop on 6 acres last year (1957-58). This seed has been purchased by the State Department of Agriculture at Rs.40/- per maund after it was dried and graded by the growers.

V. PLANT PROTECTION

The orchards are sprayed regularly and crops also in case of insect attack. The society has purchased the following **spráy** equipment :

i)	One Power Sprayer	Rs.1700/-
ii)	One Sikar Knap Sack Sprayer	Rs. 165/-
iii)	One Maruti Foot Sprayer	Rs. 287/5

The Society maintains a stock of insecticides.

VI. IMPROVED AGRICULTURAL PRACTICES

The entire area is under improved varieties of crops. Crops are invariably sown in lines. The use of Ammonium Sulphate, Superphosphate and Urea is very common, the annual consumption is over 50 tons. A fertilizer depot has

has been opened in the Colony. Green manuring is a regular practice. Crops are grown in suitable rotations.

VII. TREE PLANTING

Besides fruit trees, a large number of timber trees have been planted in the colony area. Over 1500 trees were planted during July, 1958 alone.

VIII. OTHER PROJECTS

- i) The Society has decided to develop a Squash Factory and Cold Storage plant in the Colony.
- ii) The Society proposes to build a club house, community centre, Youth Club Office, Primary School building etc. in the very near future. An area of 13 acres has been set apart for this purpose and the collection of funds started.

IX. SOCIAL REFORMS

- i) Untouchability has been abolished in practice.
- ii) All wasteful expenditure on marriages has been stopped.
- iii) Social intercourse has been encouraged among members by every member inviting all other members with families to lunch, by rotation. Such lunches are held once in every month.
- iv) This colony is very progressive due to the inspiring personality of General Mohan Singh; the far sighted leadership of the Managing Committee headed by the President, S. Kundan Singh; and its energetic Secretary, Captain Rattan Singh, who visited the U.S.A. in 1957 under the Farm Leaders Exchange Programme and the willing cooperation of the members.

X. YOUTH CLUB.

A Youth Club has recently been organised on the 4-H pattern with a membership of 13. The members have planted gram crop on 7 acres given by the Colony, as a common project, besides the individual projects of each member.

XI. CHITRA MULTIPURPOSE CO-OPERATIVE SOCIETY

This Society is running a dairy farm on commercial lines with about two dozen milch cattle; at Capt. Rattan Singh's farm.

XII. GREVAL POULTRY FARM

S. Nachhattar Singh who returned from the U.S.A. in December 1958 under the International Farm Youth Exchange Programme, is running a poultry farm on commercial lines. Capt. Rattan Singh is also planning to develop a poultry enterprise.

XIII. MODEL FARMS.

There are three model farms in the colony. They belong to :

1. S. Labh Singh who has specialised in intercropping and Vegetable growing. In 1958, he obtained a yield of 350 mds. of onions intercropped with cotton which yielded over 20 maunds of seed cotton from one acre.
2. S. Ram Singh who is managing an area of 70 acres without any hired labour, just with the part time help of his two sons that are in the local College.
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MODEL FARM OF GENERAL MOHAN SINGH AND CAPTAIN RATTIN SINGH
OF VILLAGE JUGIANA

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History.

The possession of this farm was taken in 1951 when the Garden Colony, Jugiana was established. The condition of the land was very poor, it was uneven and was covered by sand dunes. There were no buildings. First he levelled the uneven land and sand dunes with Bull Dozer. The condition of the land was very poor and it was very difficult to raise crops on such poor soil. To improve the fertility of the land, 10 trucks of silt and 5 trucks of compost were added per acre which cost Rs.6,000/-.

There were no irrigation facilities available so one tubewell was sunk in 1952 and two tubewells were sunk in 1953-54 which cost Rs.23,000/-. The delivery of each pump is three inches and is run by 5 H.P. Electric Motor.

No one cultivated the land because the area belonged to the Muslims and to improve this type of the soil was a very difficult task, so the new owners had to purchase a Ferguson Tractor and implements which cost Rs.10,000/-.

The total area of the farm is 45 acres out of which 14 acres is under garden. The Garden is composed of 10 acres of Malta and 4 acres of Mangoes. The varieties of the Malta are Red-Blood Washington Naval, Japha, Volentiolate and Pine Apple. The varieties of the mango are Chausa, Summer Pahishat, Panjauri Malda and Dosehri. The other 31 acres are used for other food and fodder crops. Twenty-one acres has been leased at the rate of Rs.70.00 per acre, which is also farmed with the same tractor.

Cropping Scheme.

The area under garden is also utilized for raising food crops, vegetables and vegetable seeds.

Dairy

Dairy is also run as a side business, it was started in 1954 with 14 buffaloes. Two Mds. of milk is supplied daily to the Engineering College Students. Two to Three hundred rupees profit is received from the dairy.

Future Plans.

The Plan is to put all 45 acres of land under garden and seed production. The seeds which are being produced and are under plan to produce are as under :-

A.	<u>Name of the seed.</u>	<u>Varieties.</u>
1.	Vegetables.	Radish, Onions, Red Carrots, Turnips and Sungras
2.	Hybrid maize.	
3.	Wheat seed.	C273

B. Cold Storage.

The Garden Colony proposes to establish a cold storage plant for garden produce and fruits which will then be sold whenever the best rate is paid.

C. Construction of ware-houses.

The Jugiana Garden Colony hopes to erect a house for the storage of farm produce*at the time of harvest and threshing of farm produce there is a glut in the market and rates come down. To avoid selling when there is a slump in the market the farm produce will be stored in the ware-houses and sold when the suitable rates are paid.

VL 3

GOVT. AGRICULTURAL COLLEGE, LUDHIANA.

A first-rate Agricultural College and Research Institute existed in the United Punjab at Lyallpur. After partition we had to start from scratch. Initially work was started in the premises of the Khalsa College, Amritsar, and then the College functioned in the rented building of the Malwa Khalsa High School, Ludhiana. We shifted to our present premises in September, 1958. The building is yet incomplete but work continues apace. So far, about Rs. 45 Lakhs have been invested in the buildings and plans for Rs. 25 Lakhs have been prepared. We will require another Rs. 15 Lakhs for staff quarters. Thus an immediate grant of Rs. 40 Lakhs is required to meet our requirements by way of accommodation for Class Rooms, Laboratories, Hostel and Quarters for Staff. We have an area 336 acres and another 174 acres is in the process of being acquired. To meet our various requirements, this area should be augmented to about 700 acres.

In 1949, we started with admitting 40 students in the 1st Year and 20 in the 5th Year. In the current year, we enrolled 80 students in the 1st Year and 35 in the 5th Year. Proposals for raising the admission to 150 in the 1st Year and 60 to the Post-graduate Classes are under active consideration.

We entered into Inter-institutional Agreement with the Ohio State University in October, 1955, and so far seven Specialists have advised us on different aspects of our work. Equipment worth Rs. 150 Lakhs and books worth Rs. 25000/- have been received and indents for Rs. one lakh worth of equipment and Rs. 50,000/- worth of books are being arranged. Three of our teachers and research workers have been trained. Four are at the Ohio State University at the present time and proposals for the next batch have been mooted. This mutual arrangement is working towards our benefit and we hope that the bonds will strengthen with the lapse of time.

An Extension Wing was allotted to us by the Ford Foundation in 1956 and the teachers employed therein have toned up our teaching in Extension Methods. Besides the Laboratory in the form of the Community Development Block of 100 villages with headquarters at the College has been giving practical training to the students. This Block has also acted as the proving ground of the new schemes that our Specialists bring forth. Hybrid Maize has been successfully produced at Jugiana which serves as the focus for the spread of this crop in the State. Plant protection measures have made a great headway in this Block and the Garden Colony Co-operative Society has

Contd. ...

Work being done on various problems which require
immediate attention.

'2'

showed initiative in purchasing a mist-blower
and issuing the same on rental basis to the
cultivators.

At present this section is required to undertake under-
graduate and

I. OUR IMMEDIATE REQUIREMENTS:-

i- Funds for New Buildings: Rs. 40 Lakhs

ii- Land : 300 Acres.

iii- Laboratory Equipment : Rs. 2 Lakhs.

iv- Books & Periodicals : Rs. 1 Lakh .

v- Staff : Exchange of half a
dozen research
workers and teachers
every year with
facilities for
appointing
substitutes.

(i) Urban Garbage Scheme:-

Substantial amounts of plant material
food and industrial crops grow in
their way into sewage sludge, which soil
In order to reclaim these nutrients and
valuable compost

vi- Scholarships

in this State
200,000 tons of compost are produced annually
cultivators. For efficient utilization and
of compost it is essential that laboratory
research and quality control be maintained.
: A dozen Scholarships
: of Rs.150/-per
: mensem for two years
: for students in
: M.Sc. and six for
: Ph.D. of Rs.200/-
: per mensem.

(ii) Scheme for the Development of

This scheme is concerned with the development of the
following aspects in rural areas:-

(a) Better and larger utilization of cattle dung, urine and
other organic wastes for industrial purposes.

(b) Night soil collection and utilization in village panchayats.

(c) Intensification of green manuring.

Work under the scheme is in progress in 88 C.D. and M.S.S.
Blocks. One District Inspector is posted in each of these blocks
and it is proposed to double the production of compost over
a period of three years. More blocks will be taken up in the
next year and ultimately the whole area of the State will be
covered.

(iii) Preparation of Legume Bacteria Cultures:-

Under this scheme cultures of specific and efficient
strain of nodules bacteria especially for berseem and alfalfa
alfalfa (Lucerne) and peas are supplied to cultivators on
no profit and no loss basis. These cultures are proving very
useful.

2. Problems which require immediate attention

(1) Sectioning of Animal Nutrition Research Units:-

In India we have reached a stage where cattle and horses

showed initiative in purchasing a new-fangled
and testing the same on rental basis to the
cultivators.

I. OUR IMMEDIATE REQUIREMENTS:-

- i- Funds for New Buildings: Rs. 40 Lakhs
- ii- Land : 300 acres.
- iii- Laboratory Equipment : Rs. 2 Lakhs.
- iv- Books & Periodicals : Rs. 1 Lakh.
- v- Staff : Exchange of staff & doct. research work in and laboratory work from other facilities for association & substitutes.
- vi- Scholarships : a dozen scholarships of Rs. 150/- per month for two years for students in M.Sc. and B.Sc. Ph.D. of Rs. 200/- per month.

SECTION OF THE STATE BIOCHEMIST & PROFESSOR OF BIOCHEMISTRY
AND BACTERIOLOGY.

Work being done at present and the problems which require
immediate attention.

By
(G.S. Sidhu State Biochemist, Punjab)

At present this section is required to undertake undergraduate and post-graduate teaching, research and extension schemes concerning the subjects of Agricultural Biochemistry and Bacteriology. In the past proper attention has not been paid to these subjects although from the point of view of their importance in rural life, they definitely deserved much better treatment. Consequently it has been possible to start work only on a few aspects of Agricultural Biochemistry and Bacteriology which have a direct bearing on agricultural production while very important long range projects remain neglected.

Three schemes concerned with research and extension are being run in this section. They are:-

(i) Urban Compost Scheme:-

Substantial amounts of plant nutrients which are removed by food and industrial crops grown in country areas, ultimately find their way into sewage sludge, night soil and other town wastes. In order to reclaim these nutrients and convert them into valuable compost this scheme is being run in 103 urban centres in this State under the technical guidance of the State Biochemist 200,000 tons of Compost are prepared annually and distributed to cultivators. For efficient guidance and improving the quality of compost it is essential that laboratory facilities for research and quality control work are provided.

(ii) Scheme for the Development of Local Manurial Resources:-

This scheme is concerned with the development of the following aspects in rural areas:-

- (a) Better and larger utilization of cattle dung, urine and other organic wastes for manurial purposes.
- (b) Night soil composting in bigger village panchayats.
- (c) Intensification of green manuring.

Work under the scheme is in progress in 32 C.D. and N.E.S. Blocks. One Compost Inspector is posted in each of these blocks and it is proposed to double the production of compost over a period of three years. More blocks will be taken up from next year and ultimately the whole area of the State will be covered.

(iii) Preparation of Legume Bacteria Cultures:-

Under this scheme cultures of specific and efficient strain of nodule bacteria especially for berseem (Egyptian clover), alfalfa (Lucerne) and peas are supplied to cultivators on no profit and no loss basis. These cultures are proving very useful.

2. Problems which require immediate attention.

(i) Setting up of Animal Nutrition Research Unit:-

In India we have reached a stage where cattle and human

populations have started competing with one another for the available land resources. Consequently Indian cattle especially ruminants are fed a considerable part of the year on low grade roughages such as wheat straw (wheat bhusa), sorghum stalks (jowar Karvi) and rice straw. Limited amounts of green feeds and concentrates are available to supplement these low grade roughages. When fed as such these roughages form non-maintenance rations as they are deficient in digestible crude protein and certain other nutrients. Consequently the productivity of Indian cattle is the lowest in the world.

It is becoming amply clear as a result of investigations on the function of rumen in countries overseas that the study of fundamental physiological, biochemical and microbiological processes involved in ruminant nutrition combined with judiciously planned practical trials will give a basis for the solution of feeding problems long before empirical feeding can possibly assess the vast variety of available feeding stuffs, processed in different ways and fed in different mixtures. No fundamental work of this type which can have far reaching effects on improving the nutritional status of Indian cattle is being planned anywhere in India. Study on these lines will help in

- (i) The better and large utilization of these low grade roughages by supplementing them with ~~essential~~ essential nutrients such as trace elements, newly discovered cellulolytic factors etc.

- (ii) Feeding of molasses, starch, urea and some other nitrogenous compounds to provide microbial protein to the ruminants for maintenance and growth.

- (iii) The optimum proportions in which these roughages should be mixed with feeds to get best results.

- (iv) Discovery of new sources of cattle feeds. There is a very urgent need of starting this type of work in this Institute where necessary facilities can be provided and in this connection help of Ford Foundation is solicited.

2. Training in the field of soil Microbiology:-

At present this section is in great need of a qualified soil microbiologist who could start research on the pressing problems on soil microbiology in this State.

3. General Administrative and Technical Problems.

There are some very important administrative problems which need solution before the agricultural teaching, research and extension can be streamlined and deliver the goods. At present most of the time of technical officers is wasted in unnecessary correspondence, account matters and other office routines and consequently they are left with very little time which they can devote to the technical side of their job. This is resulting in a great wastage of intellect and specialized training. Moreover in most of the cases the technical heads are held responsible over matters, on which they have no authority.

On the technical side there is urgent need for making careers in agricultural sciences more attractive so that men of high culture are attracted. Lot of posts remain temporary and there is no security of service, consequently people do not stick to their jobs and try to move into permanent posts even though they may be altogether of a different nature than the ones for which they are trained.

These problems have been dealt with by Agricultural Administrative Committee and by other committees previously and it is suggested that their recommendations may be reiterated.

VI.5

Notes on Sugarcane Research in the Punjab.

Sugarcane is an important cash crop of this State. In matter of acreage it occupies second position in the Indian Union. 4.94 lacs of acres were grown under this crop during the last season & this represents about 10% of the acreage in the country.

The salient features of the work are given below:-

Varietal.

Though by virtue of the geographical position sugarcane does not set seed in this State and thus actual hybridization work is not possible yet this was the first State where hybrid canes were adopted in general cultivation in the early *twenties*. Some of the very first seedlings raised at Coimbatore namely Co. 205 and Co 285 attained status of commercial canes. The systematic work on sugarcane Research was started in 1934 at Lyallpur (Rasulwala) now in West Pakistan. At this station raising of sugarcane seedlings from hybrid seed was started in 1936 and valuable varietal stock was built which was lost due to partition in 1947. The work was started at Jullundur after partition. The raising of sugarcane seedlings from hybrid seed obtained from Coimbatore had been started at this station also but since 1953 this useful line of work has come to an end as the Sugarcane Breeding Institute Coimbatore has stopped the supply of hybrid seed and only seed cuttings are supplied. This has cut at the very roots of the basis for varietal selection and has created a bottle-neck in the evolution of varieties.

The harvesting season of cane spreads almost over six months starting from end of November to almost end of April or even later. The aim of varietal evolution is to evolve varieties of different grades of maturity so that varieties at peak maturity are available throughout the harvesting season. Apart from this, characters like drought & frost, and common pests and diseases are also

taken into consideration. The varieties on the approved list are Co.L.29, Co313(early maturing) Co.L.9 and Co285(Midseason) and Co312 & Co453 (late maturing). Apart from these

varieties Co976, Co838(early) Co.j.38, Co.j.39, Co.j.46 as later ones are showing promise.

Memorials:

Experiments conducted over a number of years have shown that out of the three major nutrients Nitrogen, phosphorous and potash only. Nitrogen has shown response in yield on cane crop, P & K in combination with N has not shown any response.

In time of application trials of Nitrogen fertilizers earlier application has shown better response.

Micro nutrients so far tried have not shown any response on yield.

In the cultural trials 2 feet sowing has shown better results than either one foot sowing or distances over 2 feet.

In the germination trials Aereton and Agloli mercural fungicides have shown beneficial effect on germination.

Apart from this work on insect pests and disease is also carried on & useful remedial measures for some insect pests and diseases have been evolved.

(1) Soil survey work in the area of the Sugar Factory zones has also been undertaken and recom survey in Jagadhri, Phagwara factory zones has been completed.

In case of maize, however, the bulk of the area is still under local types. Hybrid maize has been introduced. Plans are under way to completely replace the indigenous seed with hybrid seed during the next two or three years. The successful production of about 1000 mts. of Hybrid maize seed in one of the villages of this Block (Jagadhri) is an important landmark in this programme.

Sufficient quantities of suitable seeds are sometimes not forthcoming. Purchase of a 25 acre seed farm in the Block to cater to its needs, is being finalised. While this will be a long way in supplying seed, the cultivation of the seed will have to be left to private agencies to meet the growing demands of farmers.

(2) Use of fertilizers

The consumption of fertilizers will reach 500 tons during the year.

taken into consideration. The varieties on the opposite list are Co.1.38, Co.13(early maturing), Co.1.2 and Co.28(early maturing) and Co.1.2 & Co.28 (late maturing). Apart from these varieties Co.76, Co.28(early), Co.1.38, Co.1.39, Co.1.40 as later crops are showing promise.

Summary

Experiments conducted over a number of years have shown that out of the three major nutrients Nitrogen, Phosphorus and Potash only Nitrogen has shown response in yield on some crops, P & K in combination with N has not shown any response.

In time of application trials of Nitrogen fertilizers and earlier application has shown better response. Micronutrients so far tried have not shown any response on yield.

In the cultural trials 2 feet covering has shown better results than either one foot sowing or distance over 2 feet.

In the germination trials Aeration and light treatment have shown beneficial effect on germination. Apart from this work on insect pests and diseases is also carried on a useful material measured for some insect pests and diseases have been evolved.

Self survey work in the area of the sugar factory zone has also been undertaken and some survey in Jagadhri, Phagwara factory zones has been completed.

VI.6

Progress of work in Ludhiana Community Development Block
under
Agriculture and Animal Husbandry
Extension Program

-oOo-

I. Introductory.

Started on October 2, 1954 on the National Extension Service pattern. The Ludhiana Block was integrated with the Extension Wing of the Government Agricultural College, Ludhiana in 1956 in order to serve as a live laboratory for the students of the College undertaking a course of training in Extension and Rural Sociology as well as the normal functions of a block. The Block entered the C.D. stage on April 1, 1957 and is due to enter the post intensive phase in April 1960.

Since its association with the Extension Wing, the block has been assuming new responsibilities of developing and testing new approaches and new programmes as well as staffing patterns for development of rural areas.

The Block covers 101 villages of the Ludhiana Tehsil, with population of 100868 and an area of 100134 acres or 158.32 sq. miles. Area under cultivation is 94791 acres out of which only 55720 acres are irrigated.

II. Agriculture

A preponderant majority of the population in the Block derives its livelihood from farming. Agriculture has therefore received the major attention in the programme of the Block.

Important crops grown are :--- (1957-58)

Wheat	...	22691	acres
Wheat & Gram	...	17761	"
Gram	...	10142	"
Oilseeds	...	10509	"
Maize	...	9860	"
Cotton (American)	...	8028	"
Cotton (Desi)	...	2078	"
Sugarcane	...	2574	"
Kharif fodders	...	12206	"
Barley and Gram	...	532	"

In order to step up the yields of these crops, emphasis has been laid on the following steps :-

(1) Use of Improved Seeds :-

Nearly 17000 mds. of seed of improved varieties of various crops notable wheat and cotton has been supplied since the Block was started. Practically the whole of the area under wheat, groundnut, sugarcane etc. is under improved varieties. In case of cotton, 80% of the area is under improved American varieties. In case of maize, however, the bulk of the area is still under local types. Hybrid maize seed has been successfully introduced. Plans are underway to completely replace the indigenous seed with hybrid seed during the next two or three years. The successful production of about 1600 mds. of Illinois 1656 hybrid maize seed in one of the villages of this Block (Jogiana) is an important landmark in this programme.

Sufficient quantities of reliable seeds are sometimes not forthcoming. Purchase of a 25 acre seed farm in the Block to cater to its needs, is being finalized. While this will go a long way in supplying nucleus seed, the multiplication of the seed will have to be left to private agencies to meet the growing demands of farmers.

(2) Use of fertilizers:

The consumption of fertilizers will touch 800 tons during the current year

which is more than ten times what it was before the Block started. This is however, far below the total requirements which should be 2000 tons on the low basis of only one maund of fertilizer per irrigated acre of land. Propaganda and intensive educational programme consisting of demonstrations, lectures, meetings, training camps, individual approach, distribution of posters, leaflets, visits to progressive farms etc. undertaken by the Block agency has proved extremely helpful. Increase in the number of fertilizer depots as well as the issuing of fertilizer loans on the spot arranged in the form of a campaign also yielded very encouraging results. The success was, however, impeded by high cost of fertilizers, inadequate supplies and cumbersome procedures for the issue and recovery of fertilizer loans.

(3) Plant Protection :

Plant protection measures were almost unknown in the village until this past year. As a result of the efforts made so far, particularly the deratting operations carried out regularly at least twice every year, the solar Energy treatment of wheat seed campaign under which no less than 9828 mds. of wheat seed was treated against Loose Smut disease of wheat during 1958, and the campaign for spraying against Cotton Jassids, which included holding of mass meetings and field demonstrations in each village, plant protection has been accepted as an essential practice.

By the end of the current year, every village will have purchased a foot-sprayer of its own. A provision of Rs.8000/- was made in the Block budget to subsidise the purchase of this equipment. Large scale operations of spraying, however, are not possible with such equipment. Power Sprayers would be necessary in every village to control an epidemic. Supplies position of insecticides also needs to be improved so as to make these available in every village. Subsidising of the prices of pesticides is also desirable.

(4) Irrigation:

Since the Block was started 122 percolation wells have been sunk, and 80 pumping sets and 44 tubewells have been installed extending irrigation to an additional 3000 acres. Loans amounting to Rs.376,250/- have been advanced for this purpose under the Block Schemes. In spite of this, it will be noted that an area of nearly 40,000 acres is still without irrigation. The area is suitable for the minor irrigation works of the type mentioned above. But want of finances stands in the way. Irrigation should receive priority over most programme for raising agricultural production. The extremely small holdings (the average size of holding being only about 6 acres) make it necessary to switch to intensive methods of farming. Intensity of cropping must be raised to 200% immediately as against a little over 100% at the present moment. This is possible only if the entire cultivated area is fed with perennial irrigation.

(5) Other Items :

These include utilization of local manurial resources through conservations of annual dung and rural waste in proper compost pits. As many as 13306 Compost pits have been dug since the Block was started. Green manuring is being encouraged with a subsidy of Rs.2/8/- per acre towards the cost of seed. But, Extension of this useful practice is limited by the very small size of holdings.

Cultivation of fruits trees and vegetables is being encouraged through the youth clubs and otherwise, with subsidy for the purchase of seeds and plants. Timber trees are being planted to supply the much needed fuel and timber. During the Block period 9337 fruit trees and 61687 timber trees have been planted.

I. Animal Husbandry :

The following steps deserve mention under this programme :-

- (1) Supply of Bulls: Bulls for buffaloes and cows have been supplied in 43 villages. Lack of proven bulls is however a serious handicap.
- (2) Two Artificial Insemination Centres have been started, with six key villages attached to Ludhiana and one to Sanahwal Artificial Insemination Centre. Artificial Insemination needs to be developed in view of the paucity of

good bulls.

- (3) Vaccination campaigns are undertaken against H.S. and other diseases whenever epidemics are feared.
- (4) A mobile Veterinary Hospital tours round the villages of the Block for treatment of animals.
- (5) Four Veterinary Hospitals are functioning in the Block.
- (6) Three outlying Veterinary dispensaries have been organized.
- (7) There are 10 Veterinary First Aid Centres at headquarters of village Level Workers.
- (8) Poultry farming is being encouraged. Birds are being supplied at subsidised rates. A vaccination campaign to control diseases like Rani Khet has been started.
- (9) Cultivators are unable to purchase the ingredients for a complete ration in the local markets. A plan has been approved for the State Poultry Farms to make and sell a supplement for cultivators to mix with ground gram to make a complete poultry ration.
- (10) Animals bred for profitable milk production are desperately needed.

IV. Methods used to further the agriculture and Animal Husbandry Extension Programme.

- (1) Demonstration plots, method demonstrations, Result demonstrations.
- (2) Exhibitions.
- (3) Produce competitions, Model Farm Competitions, crop competitions.
- (4) Rural Melas, Cattle and Poultry competitions and Shows.
- (5) Supply of literature, distribution of posters, leaflets etc. and issuing of circulars.
- (6) Mass meetings, Training Camps, Film and drama shows.
- (7) Organization of Youth Clubs, etc.
- (8) Individual contacts.
- (9) Active participation of progressive farmers & other rural leaders of the block in planning & execution phases of the program through a purely non-official Block Planning Advisory Committee.

VI. Improvements to be made in the Block program.

- (1) Giving consideration to New Staffing patterns in a demonstration block attached to a college. Protecting ahead to the kind of Extension Workers needed for the future and the experience and training desired.
- (2) Developing - more efficient materials and supply services.
- (3) Involving the research and teaching arms of the College more extensively in Extension activities.
- (4) Developing and mobilizing the interest, leadership and support of increasing numbers of farmers to accept new practices.
- (5) Devising new methods and procedures of training college students in Extension education.

- (6) Improving the effectiveness of method and result demonstrations insuring they produce the desired education under proper supervision.
- (7) Establishing experimental villages in which new ideas and programs can be tested as well as new procedures of working through the natural strengths and resources of the village. Achieving greater unity and cooperation among village people in improving agriculture and village life.
- (8) Development of more relevant and up-to-date research on the various phases of Agricultural production, management and administration.

Extension Wing

How to improve Extension Service in India.

1. Extension Service in the State is controlled by the Development Department in areas covered by Development Blocks. One subject matter specialist is provided for each of the subjects of Agriculture, Animal Husbandry, Cooperation, Rural Engineering, Industries, Health and Sanitation, and Panchayats. The Block Development Officers who coordinate the activities of these subject matter specialists, work under the directions of Deputy Commissioners. The Deputy Commissioners are so busy with affairs relating to general administration that it is difficult for them to find enough time for development work. The Extension service and the development work could be made more effective if this work at the district level could be put under the District Agricultural Officer. The Development work is supposed to be 80 % agricultural development. This arrangement is necessary to give to agriculture the importance which is due to it.
2. There is only one Extension Officer provided at the Block level for agriculture, just like other subjects. One man can hardly look after supplies and regulatory functions with the result that he has practically no time left for educational work. Since agriculture is by far the most important subject, at least four Extension Officers must be provided for this subject.
 1. One Agronomist
 2. One Extension Officer for Soil Fertility management.
 3. One Extension Officer for Plant Protection.
 4. One Extension Officer for Horticulture development.
3. Supplies should be handled by separate staff in order to leave the Extension staff free for educational work.
4. Research work is necessary in order to develop and test staffing patterns and extension programmes suited to rapidly changing conditions and requirements. For this purpose, the Blocks attached to the Extension Wing of the Govt. Agricultural College should be utilized as an experimental Block and should be provided with the required staff and funds.
5. Extension workers do not get adequate literature and audio visual aids and equipment. These facilities need to be developed. For this information organisation needs to be strengthened. Alternatively additional staff may be provided at the Government Agricultural College as a part of the Extension Wing.

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11.8

PLANT PROTECTION ORGANISATION IN THE PUNJAB:

Over 250 species of insects alongwith a few species of arthropods and mammals infest crops, vegetables fruit trees and stored products in the Punjab. Of these about three dozens are major pests which are considered responsible for depriving the cultivators of their produce to the extent of Rs.18 crores annually. Modern developments in agriculture and the new crop pattern adopted by the cultivators during recent years have resulted in the persistent and severe incidence of various insect pests, not so serious a few years back. Protection of crops from pests has become a sine qua non for profitable agriculture.

The State Plant Protection Organisation maintains 22 centres each manned by one Plant Protection Inspector, one Plant Protection Sub-Inspector, and 3-4 fieldmen or beldars. With its assiduous efforts ever since its inception in 1947, it has been able to create consciousness among the cultivators regarding the losses caused by insects and arouse interest in the control of insect pests. Plant Protection measures which were initially started in the fruit orchards, now form the essential routine agronomic practices on the farms of the vegetable growers. The last three to four years have witnessed a growing realisation of the importance of controlling insect pests and such measures have now been extended to field crops like cotton.

The State Plant Protection Service which started with field demonstration of the various control measures is now hard put to cope with this work. During the first three years of our Second Five Year Plan, 34 to 38 lac acres were baited against field rats, 3,12,000 to 3,22,000 fruit trees and 88,000 to 1,06,000 acres of crops were treated against insect pests every year. The targets set for the remaining period of this plan are as follows:-

	<u>1959-60</u>	<u>1960-61</u>
Baiting of rats		
Spraying of fruit trees.	38,00,000	41,00,000
	2,00,000	2,15,000
Spraying of crops	25,000	27,000

Our targets for the Third Five Year Plan are very ambitious and with their achievement it is not too much to expect an increase of 10-15% in our production. With the increase in our targets a corresponding increase in the existing resources of the State Plant Protection Service by way of staff, application equipment and supply of insecticides is imperative if the desired results are to be achieved.

With our existing team of 1-2 plant protection inspectors, 1 sub-inspector, 3-6 fieldmen or beldars per district, it is possible to contact a small percentage of the rural population. Our proposals for the Third Five Year Plan include a gazetted subject matter specialist and a unit of one plant protection ix inspector, 3-4 fieldman at the N.E.S. block level. For the co-ordination of the work in the State provision of two Deputy Directors of Plant protection (class I) is a necessity. For imparting training in the control of insects and handling of application equipment to the cultivators in the villages, provision of two mobile squads is envisaged.

A fleet of application equipment consisting of 34 power sprayers, 28 power dusters, 1713 hand operated sprayers and 4342 hand rotary dusters is maintained by the State Plant Protection Service. It is proposed to issue 3600 bucket pumps, 600 ~~working~~ foot pumps, 600 rocking sprayers and 360 hand rotary dusters to the cultivators at 50% subsidised rates by the end of the Second Five Year Plan. In addition, the N.E.S. blocks and the market committees are also purchasing their own equipment for issue on subsidised rates or rental to the cultivators. The problem of insect control is so gigantic that all this equipment is considered meagre to meet the requirements of the State in this respect. It is, therefore, proposed to supply one hundred high and low volume power sprayers to the cultivators at subsidised rates per year during the course of the III Five Year Plan so that it is possible to spray larger areas of crops in a comparative ly short time. Regular flow of spare parts of the imported application equipment, will materially enhance the efficiency of the State Plant Protection Service and a provision for the same is our urgent need. Two mobile workshops for the repair of the application equipment with the cultivators in the villages will greatly help in keeping the equipment in action and in prolonging its life. This facility will prevent the falling of this huge application equipment in the hands of not fully trained village/small-town artisans/mechanics who are not conversant with the repair and upkeep ~~ex~~ procedure of the newly imported equipment. The total cost ~~ex~~ of importing 500 power sprayers, with spare parts and mobile units is expected to be rupees ten lakhs.

3. A regular supply of pesticides acts as a bottle neck periodically in our war against pests. Regular flow of imported pesticides in abundant quantities is necessary. The Plant Protection Adviser to the Govt. of India has mooted proposals for centralised imports of pesticides and entering into trade contracts for pesticides on all India basis. It is hoped that these plans will materialise soon.

Entomologist, Punjab,
Ludhiana.

Securing war sections

A staff meeting will be called to examine the situation and will be requested to take steps to achieve the objectives.

Other personnel will be called for explaining the situation and assistance in order to achieve the objectives.

Operational programme

The basis for a programme in the experimental village leaders. The programme is reasonable for the

A list of application equipment consisting of 34 power sprayers, 28 power dusters, 1713 hand operated sprayers and 4343 hand rotary dusters is maintained by the State Plant Protection Service. It is proposed to issue 3600 bucket pumps, 800 knapsack foot pumps, 600 foot sprayers and 360 hand rotary dusters to the cultivators at 50% subsidised rates by the end of the second five year plan. In addition, the N.E. blocks and the market committees are also purchasing their own equipment for issue on subsidised rates or rental to the cultivators. The problem of insect control is so gigantic that all this equipment is considered meagre to meet the requirements of the state in this respect. It is, therefore, proposed to supply one hundred high and low volume power sprayers to the cultivators at subsidised rates per year during the course of the III Five Year Plan so that it is possible to spray larger areas of crops in a comparative ly short time. Regular flow of spare parts of the imported application equipment, will materially enhance the efficiency of the State Plant Protection Service and a provision for the same is our urgent need. Two mobile workshops for the repair of the application equipment with the cultivators in the villages will greatly help in keeping the equipment in action and in prolonging its life. This facility will prevent the falling of this huge application equipment in the hands of not fully trained village/semi-town artisans/mechanics who are not conversant with the repair and upkeep of the newly imported equipment. The total cost of importing 600 power sprayers, with spare parts and mobile units is expected to be rupees ten lakhs.

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Entomologist, Punjab,
Ludhiana.

Operational Approach to a Village Experimentation

Administrative responsibility.

The administrative responsibility for the program in village experimentation will rest in the hands of the Professor of Extension, Agricultural Development Officer, the Lecturer in Evaluation and other members of the Block Staff required. The Lecturer Evaluation will assume the responsibility of serving as the contact man for each of the three villages. In a sense he will serve in the role of a specialized Village Level Worker. He will work closely with the Village Leaders assessing their needs and interests, then program proposals will be jointly formulated and reflected to the proper sources, channels and officials. The TCM consultant in Rural Sociology will serve as an advisor working actively and closely with every phase of the experimental program.

Village Selection Procedures.

Selection will be made on the basis of four criteria. These are:

1. A village that has a strong Panchayat Leadership which is serving the needs of the people in a satisfactory manner.
2. A village that is relatively free from internal strife and conflicts which split the villagers into factions.
3. A village which has its land holdings consolidated.
4. A village which will volunteer to participate in the experiment under the conditions specified.

Tentative selection of the three experimental villages will be made through a process investigating and consultation involving the Block Staff and the Block Advisory Committee members. A final selection will be made by the Block Staff and members of the Executive Committee sending an approach to each of the villages selected to determine their interest and willingness to voluntarily associate themselves with this experimental approach. The final step of obtaining village approval will be accomplished by sitting with the Panchayat and representative group of leading cultivators and explaining the proposals to them. Ample time will be given for them to further discuss the proposal among themselves and indicate to Block Staff their desires about participating.

Securing participation of various college sections and District Heads of development departments.

A staff meeting of the Government Agricultural College will be called to explain the purpose of Village Experimentation and they will be requested to assist the Extension Wing for accomplishing the objectives.

Other personal contacts will be made to such persons as District Heads of Revenue, Agriculture, Electricity and Irrigation Departments for explaining the purpose of the program and seeking their assistance in order to accomplish the overall project.

Operational Procedure.

The basis for a village entering into an agreement to participate in the experimental approach will be carefully intimated to village leaders. There are certain expectations which will be reasonable for the villages to entertain and there will be other

..over

expectations which will not be fulfilled within the broad framework of the approach. Some services and assistance which the village can properly expect:

- (i). Assistance will be offered to village leaders in assessing their present situations, their land use patterns, crops, yields, resources, problems, supply services, record keeping, and decision making procedures.
- (ii). Having obtained a functional picture of what is in the village, assistance will be given to help identify other possible alternative approaches which can be recommended for farmers and village leaders to consider as a basis for sound decision making.
- (iii). Adequate opportunities will be provided for village leaders to discuss, investigate and explore the best farming approaches for them to adopt. Every effort will be made to supply the necessary information, consultation and assistance in successfully carrying out selected farming practices. The effort here will not be to tell the leaders and the farmers what to do, it will be to give them the necessary information in the firm belief that the people themselves will make the right decisions. Our role then will be to help them to implement their choices.
- (iv). Attention will be given to how the system of administrative procedures function between and among various departments of Government in so far as village leaders and farmers are properly concerned. Careful investigation and analysis will be undertaken such as; the system of loans for fertilizers, loans grants for irrigation, supply of fertilizers, seed, pest control equipment, the system of record keeping, revenue collection, granting of co-operative credit and repayment etc. Assistance will be rendered wherever possible in encouraging the efficient operation of these administrative procedures and processes.
- (v). Major emphasis will be given to village leaders and farmers in helping them to recognize and consciously use systematic planning procedures for their activities to thoroughly explore the advantages of cooperation one with another in pushing their solid course of action. Help will be available in learning the techniques identifying the nature of their most important problems and exploring potential alternative solutions. A conscious process of teaching village people the advantages of democratic decision making will always be a feature of the approach.
- (vi). Assistance will be given to village leaders in helping them to explore the wide range of resources available to them which are generally available upon request but which are seldom used to their full capacity.
- (vii). Conscious assistance will be given on the principle of helping village people to help themselves. A guiding framework for the amount and kind of assistance rendered to the demonstration villages will be the consideration of not offering any assistance which cannot be equally rendered to any other village in the Block, given more time and trained personnel. These employees with the demonstration villages cannot expect to be given financial grants, subsidies and remunerations beyond the ability of the Block to render similar services to every other village in its jurisdiction.

- (viii). The real experimentation involved is that of testing the action of whether villages cannot make significantly more progress at a faster rate by consciously using sound practices of democratic decision making, group problem solving. Wise use of resources and freeing their minds from the tyranny of many restrictive habits and customs which for centuries have mitigated against achieving improved levels of living and a satisfying life in the village.

Relationships of experimentation in 3 villages to the program in the remaining villages in the Block.

The normal functioning of the program in the villages in the block will not be directly affected. It is expected that this program will proceed and hopefully continue to improve as greater insight and experience as gained in administration, planning and techniques of application. The experimental villages will be treated in a special way, while generally the same type of activities will be undertaken as in other villages, complete freedom will be exercised in using different or new approaches to accomplish the same ends. The V.L.Ws. in each of the 3 circles where the experimental villages are located will be actively involved in each phase of the experimental approach in the village lying within their circle. The obvious purpose here will be to train the V.L.Ws. in new techniques and procedures of carrying out Extension activities. As new insights and useful procedures are developed, this information will be passed along to the V.L.Ws. for their consideration and use in other villages. The special insight and experience which Extension Advisors on the headquarters staff may gain can also be integrated into their planning and program procedures in other villages in the block. Further the services of the various departments in the College hopefully will become more easily available, and functionally useful in the block program. There is every indication therefore, that the presence of three experimental villages will greatly assist rather than impair the normal functioning of the Block program.

Visiting Firemen.

Attention will be given to limit the number of visitors to these experimental villages. The visits to such villages should in no way hamper the normal working. The contact-man should be consulted in regard to any outsiders coming to the three villages in connection with the program such that the necessary coordination and control is exercised.

A SHORT NOTE ON THE MEASURES NEEDED TO INCREASE
FOOD PRODUCTION FROM PUNJAB SOILS-

BY

DR. J. S. KANWAR, AGRICULTURAL CHEMIST AND PROFESSOR
OF CHEMISTRY, GOVERNMENT AGRICULTURAL COLLEGE,
LUDHIANA.

Improving the deteriorated soils and raising the fertility of soils are two surest means of increasing food production in the country.

About 9 millions acres of land have been affected by water logging, 3 million very seriously. Another 3 million acres have been affected by salinity and alkalinity and about a million acres of land in the State are highly acidic. The fertility status of the soils of the State is also very low. The following steps are needed to be taken up to improve these soils.

I. Drainage :- It is high time that the importance of installation of good soil drainage system in the areas already under irrigation or to be brought under irrigation is realised- Drainage channels parallel to irrigation channels and tile drains in the field are essential. I realise that this would involve huge costs but it does not seem to be a sound policy to put more and more area under irrigation when the area already under irrigation is going out of cultivation.

The canal irrigation in the districts of Hoshiarpur, Jullundur, Ludhiana and Gurdaspur where sub-soil water is of good quality and rainfall about 25" should be stopped forthwith and instead tube well irrigation resorted to and the canal water diverted to areas where sub soils water is of poor quality.

II. Reclamation of Alkaline and Saline soils, In this State certain methods have been evolved to reclaim alkaline and saline soils. About 80% of these soils are both alkaline and saline. Cultivators would be induced to take up reclamation of these soils when the State supplies them on nominal cost gypsum, fertilizers and the seed of green manure crops like Sesbania. Search for most effective methods of utilising these soils should be constantly made.

III. Soil conservation. Linked with the twin menace of water logging and alkalinity and salinity is the programme of soil conservation. No Scheme of drainage would be successful until and unless intensity of floods is reduced. These floods cannot be reduced without adoption of improved soil conservation measure both in the hills and in the plains. It needs to be stressed that soil conservation is not forestry alone, which impression unfortunately is held in this State. For success of conservation work the following measures can be suggested:-

- i. Soil survey.
- ii. Establishment of soil conservation service in the Department of Agriculture.
- iii. Establishment of soil conservation training centre in the State.
- iv. Providing of subsidy to the cultivators.

IV. Improvement of Acid soils. Acid soils need lime but the cultivators do not use lime as the acid soils are located in the tracts where the cultivators are too poor to afford it. To popularize lime it should be provided on subsidised basis.

V. Improving the fertility of soil. If we have to improve the yields of our crops we must apply artificial fertilizers to all of our cultivated soils. But we are short of fertilizer at present and would remain so in the foreseeable future until we increase our fertilizer production. Nangal factory is to produce 80,000 tons of nitrogen and has to cater for the needs of Punjab, Kashmir and Himachal. But the requirement of this region are ^{not} likely to be less than 2,00,000 ^{tons} of nitrogen alone. So one more fertilizer factory must be installed in the Punjab. Secondly in the areas where the buying capacity of the ^{is low} fertilizers should be made available on the reduced rates so that the farmers may get use to their application.

VI. Arrangements for repair of apparatus. There are no facilities for getting the apparatus which is received from U.S.A. under T.C.M. or purchased from other foreign countries repaired. It would be better if arrangements could be made with the manufacturers of these apparatus to open service and repair

unit in the country or Government sets up its own repair centre.

VII. Intensification of Research on soils, fertilizers and irrigation.

There is more need for research on soils, fertilizers and irrigation. Most of the research is being conducted under Schemes sanctioned on temporary basis. Some of the schemes are renewed year after year. Most of the time of the technical staff is spent in making extension proposals and seeing the proposals being carried through at different stages. Research is also handicapped for want of enough apparatus. Research on soils is considered no body's responsibility.

Intensification of research on the following problems is badly needed:

1. Salinity and alkalinity.
2. Soil fertility.
3. Soil physics.
4. Micronutrient deficiency.
5. Water requirements of crops.
6. Soil testing.

For this work the staff should be engaged on a permanent basis. As soil work is considered no body's responsibility therefore it is suggested that a soil and plant nutrition research institute should be set up which should concentrate on the fundamental problems of soils in this State.

Tentative Fertilizer Requirements.

Sr. Crop No.	Dose in Lbs/acre N P ₂ O ₅ K ₂ O	Region or Distt.	Time and method of application	Remarks
1. Wheat	40 20 20	Hoshiarpur, Gurdaspur, Ambala, Patiala, Kapurthala, Ludhiana or Jullundur (Nawanshahr by Block).	Application of N & NP and NPK by drilling at sowing or application of N alone by broadcasting with first irrigation.	
	40 20-40 -	Kangra		
	40 20 -	Jullundur, Amritsar, Karnal, Bhatinda.		
	40 - -	Remaining districts.		
2. Barley	25 - -	South Eastern district.	Broadcasting.	
Maize (Local)	40 25 50 25 50 25 50 -	Kangra Gurdaspur, Hoshiarpur Ludhiana, Patiala, Jullundur. Remaining districts.	Application of N and NP and NPK by drilling at sowing or application of N alone by broadcasting with first irrigation.	1. Liming @ 400-1100 Lbs/acre depending upon pH and texture is necessary for soils with pH below 6.0 2. Application of P and K may be made after soil test. For C. 273 variety application of K is essential. 3. Liming @ 400-1100 Lbs/acre necessary for soils with pH below 6.0 4. Application of P or K may be made after soil test.
Hybrid	100 50 50	For all districts.	-do-	3. Dose of N may be reduced to half if maize follows berseem.
3. Paddy.	40 20 30 20 40 -	Karnal, Gurdaspur Kangra. Remaining districts.		N to be applied 3 weeks after transplanting. P & K for finer varieties. may be drilled before flooding.
4. Bajra	30 - -	All Districts		With 1st showers of rain or drilling at sowing. and half
5. Cotton	40 - -	Amritsar, Jullundur, Gurdaspur, Hoshiarpur,		Half at thinning at preflowering to be drilled on both sides.

50-60 - Other cotton ~~Wax~~
growing districts
of the State.

6-Sugar- 100 cane(new)	-	-	For all districts	Half at sowing time and half in June. Drilling at sowing and side dressing in June. In case of ratcon half doze in Feb. and March and the other half in June.
(Ratoon) 140	-	-	-dc-	

7. Potato	100	50	50	Ludhiana, Hoshierpur, Ambala.	Half at sowing and half at earthing up.	Application of P & K may be made after soil test-
	100	50	-	Kapurthala, Jullundur,		

8. Tobacco (75-100 - - For all districts.) To be applied in two
(Desi)- split doses.

9. Gram(	-	25	-do-	To be drilled at sowing	Application of N may be made after soil test.
(Desi)					

10. Groundnut	- 25 in S/P	-do-	Application of K may be made after soil test.
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11. Berseem	25	50	--	do--	Broadcast before sowing.	Higher doses of P are also economical.
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12. Sudan grass 50	50	50	50
12. Sudan grass 50	50	50	50

13. Jowar Fodder 30	-	-	-do-
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14. Vegetables

(a) Sweet potatoes	50	-	For all Districts	To be applied at sowing.	P & K may be applied when indicated by soil test.
(b) Carrots	50	-	-do-	-do-	-do-
(c) Brinjals.	50	-	-do-	-do-	-do-
(d) Onions	100	-	-do-	-do-	-do-
(e) Tomatoes.	50	50	-do-	-do-	-do-
(f) Califlower	50	50	-do-	-do-	-do-
(g) Cabbage.	50	50	-do-	-do-	-do-
(h) Colocasia	50	50	-do-	-do-	-do-
(i) Peas & Chillies	50	50	-do-	-do-	-do-

15. Oil seeds

(a) Sarsaon.	30	15	-do-	To be drilled before sowing.	-
(b) Toria.	50	25	-do-	-do-	-
(c) Raya	40-60	-	-do-	-do-	-
(d) Linseed	80-120	50	-do-	To be applied at the end of Feb. or beginning of March.	-

16. Tea

17. Fruit Trees.

Citrus and apples. 1/8th Lbs. N per tree of 1 year age upto 8 years. After 8th yrs. 1 Lb to 1.5 Lbs N per tree.

Half in Feb. and half one month after flowering indicated by soil test. is over.

- Note: 1. Where N alone has been recommended, application of P & K may be made if indicated by soil test.
 2. In case of crops which usually receive basal dose of farm yard manure, in case of non availability of Farm yard manure or compost for application as a basal dressing additional application of 1.5 Lbs N, 0.5 Lb P₂O₅ and 1 Lb K₂O per cart load of F.Y.M. is desirable.
 3. In case of sandy soils split doses of fertilizers and lighter irrigation are desirable.
 4. The dose may be modified according to type of followed, cultural and other Agricultural practices followed and variety of crops sown.
 5. In case of saline and alkaline soils, reclamation methods should be followed for getting good stand of crops.
 6. For any other information regarding fertilizer recommendations consult the Agricultural Chemist, Punjab, Ludhiana or the Agricultural Inspector of your circle.

Ready Reckoner for determining the amount of various fertilizers in seers from the dose given in lbs of various element nutrients.

Name of the fertilizer.	% element nutrient contained	Dose of nutrient in seers.					Equivalent amount of fertilizer in seers.		
		20	25	30	40	50			
<u>Nitrogenous</u>									
Ammonium sulphate or Calcium Ammon. Nitrate.	20%	49	61	74	98	122	148	183	244
Ammonium sulphate Nitrate.	26%	38	47	56	76	94	112	141	188
Urea	44%	22	28	33	44	56	66	84	112
<u>Phosphatic</u>									
Superphosphate (Single)	16%	61	76	92	122	152	184	228	304
Dicalcium phosphate	32%	30	38	46	61	75	92	114	152
<u>Potassic</u>									
Sulphate of Potash.	48%	20	25	30	40	50	60	75	100
Muriate of potash.	60%	16	21	25	32	42	50	62	84

W. L. L. L.
Agrochemical Chemicals,
Patents, India

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ANNUAL PROGRESS REPORT OF THE SCHEME
DISTRIBUTION OF MICRONUTRIENTS IN THE PUNJAB SOILS
AND THEIR EFFECT ON THE YIELD OF CROPS.
(FOR THE YEAR 1957-58).

GOVERNMENT AGRICULTURAL COLLEGE
LUDHIANA.

SCHEME FOR THE DISTRIBUTION OF MICRONUTRIENTS IN THE
PUNJAB SOILS AND THEIR EFFECT ON THE YIELD OF CROPS.

ANNUAL PROGRESS REPORT FOR THE YEAR 1957-58 (10th October,
1957 To 30th June 1958)

SECTION A-GENERAL.

1. DATE OF COMMENCEMENT OF RESEARCH WORK UNDER REPORT. 10th October, 1957
2. DATE ON WHICH PRESENT PERIOD OF THE SCHEME WILL EXPIRE. 28th February, 1959
3. TOTAL AMOUNT SANCTIONED FOR THE ORIGINAL PERIOD

	<u>Share of the Council.</u> Rs.	<u>Share of the State Govt.</u> Rs.	<u>Total</u> Rs.
Recurring	4660.00	4660.00	9320.00
Non-recurring.	-	-	-
Total:-	4660.00	4660.00	9320.00

4. TOTAL AMOUNT SPENT

	<u>Share of the Council.</u> Rs.	<u>Share of the State Govt.</u> Rs.	<u>Total</u> Rs.
Recurring	1500.45	1500.44	3000.89
Non-recurring	-	-	-
Total:-	1500.45	1500.44	3000.89
Receipts.	Nil		

5. STAFF EMPLOYED (Excluding Class IV)

	<u>Name and Qualification.</u>	<u>Date of appointment</u>	<u>Designation</u>	<u>Scale of pay.</u>
(1)	Sh.N.S.Randhawa M.Sc.(Agri).	10.10.57	Analytical Chemist.	250-25-500/ 25-750.
(2)	Sh.Sat Pal	19.2.58	Field Assis- tent.	50-3-80/ 4-100

The post of 2nd Field Assistant and Laboratory attendant are lying vacant and have not been filled so far.

6. OBJECT OF THE SCHEME.

i. Micronutrient survey.

Assessment of the micronutrient status of the Punjab Soils.

ii. Field Experiments

To study the effect of the application of the micronutrients on the yield of crops.

SECTION B - TECHNICAL PROGRAMME

APPROVED TECHNICAL PROGRAMME FOR THE ENTIRE PERIOD.

1. MICRONUTRIENT SURVEY. (a) To expose soil profiles and to collect soil samples from different types of soils met with in various climatic zones of this state.

(b) To analyse these soil samples for texture, pH, total soluble salts, organic carbon, Exchangeable bases, total and available amounts of micronutrients.

ii. FIELD EXPERIMENTS

To lay out field experiments on maize and wheat in the Districts of Kangra, Ludhiana, Gurdaspur and Patiala.

iii. STUDY OF THE CAUSES OF CHLOROTIC CONDITION OF CITRUS TREES.

(a) To expose soil profiles in the Gardens exhibiting chlorotic symptoms.

(b) To analyse the soil samples for various macro and micronutrients.

(c) To collect healthy and chlorotic leaf samples and to analyse them for various macro and micronutrients.

2. DETAILED PROGRAMME OF WORK FOR THE YEAR UNDER REPORT.

FIELD EXPERIMENTS.

(i) To lay out field experiments to study the effect of the application of micronutrients on the yield and quality of wheat.

(ii) (a) To expose soil profiles at the bases of normal and chlorotic citrus plants and to analyse the soil samples for macro and micronutrients.

(b) To collect and analyse healthy and chlorotic citrus leaf samples.

(iii) MICRO-NUTRIENTS SURVEY.

To collect and analyse soil samples from the districts of Kangra, Gurdaspur, Ludhiana and Patiala.

3. DETAILED PROGRAMME FOR THE NEXT YEAR.

MICRONUTRIENT SURVEY.

To collect and analyse 100 soil samples from the districts

-3-

of Kangra, Ludhiana, Gurdaspur and Patiala.

ii. FIELD EXPERIMENTS.

To lay out eight replicated field experiments on wheat and maize in the districts of Kangra, Ludhiana, Gurdaspur and Patiala.

(b) To analyse 50 plant samples collected from various field experiments.

(c) To lay out Pot experiments to study the effect of the application of macro and micronutrients on the yield and quality of wheat under controlled conditions.

SECTION C

MATERIALS & METHODS.

COLLECTION & PREPARATION OF SOIL SAMPLES.

Soil samples were collected from soil profiles exposed in gardens exhibiting chlorosis of citrus trees. Samples were taken by means of a 'wooden Khurpa' and were stored in alkathene bags. After air drying, these were pounded with wooden pestle and mortar and passed through 2mm sieve. Crushed material was finally ground in agate pestle and mortar to pass through 100 mesh sieve and the representative fraction was taken for analysis.

COLLECTION & PREPARATION OF LEAF SAMPLES.

Third and fourth leaves were collected from 3 to 4 months old shoots. These leaves were washed two times with distilled water and again twice with redistilled water before drying. Air dried samples were crushed and stored in polyethylene bottles.

METHODS OF ANALYSIS.

MECHANICAL ANALYSIS

The mechanical composition of the soil was determined by the International pipette method.

ORGANIC MATTER.

It was determined by Walkley and Black rapid titration method (C.S. Piper soil & plant analysis page 223, 1950)

CALCIUM CARBONATE.

Puri's method (Imp. Inst. Agri. Res. Pusa Bul. 206, (1930)

TOTAL NITROGEN

AO AC 2.25 Page 13 1950

TOTAL CATION EXCHANGE CAPACITY

Brad-field and Allisan's method (C.S. Piper soil and plant analysis Page 187 (1950)

EXCHANGEABLE CALCIUM

Non-calcareous soils (C.S. piper soil & plant Analysis page 169(1950)

Calcareous soils (C.S. Piper soil and plant Analysis Page 170)

AVAILABLE PHOSPHOROUS

It was determined by Olson's method .

pH VALUE

The pH value was measured in 1:2 soil water suspension by Beckman pH meter.

ELECTRICAL CONDUCTIVITY.

It was determined in 1:2 soil suspension by using solu bridge.

ZINC & COPPER

These were determined according to method adopted by Holms (1945)

TOTAL MANGANESE

It was estimated by the method adopted by Willard and Great-House (1917)

REDUCIBLE MANGANESE

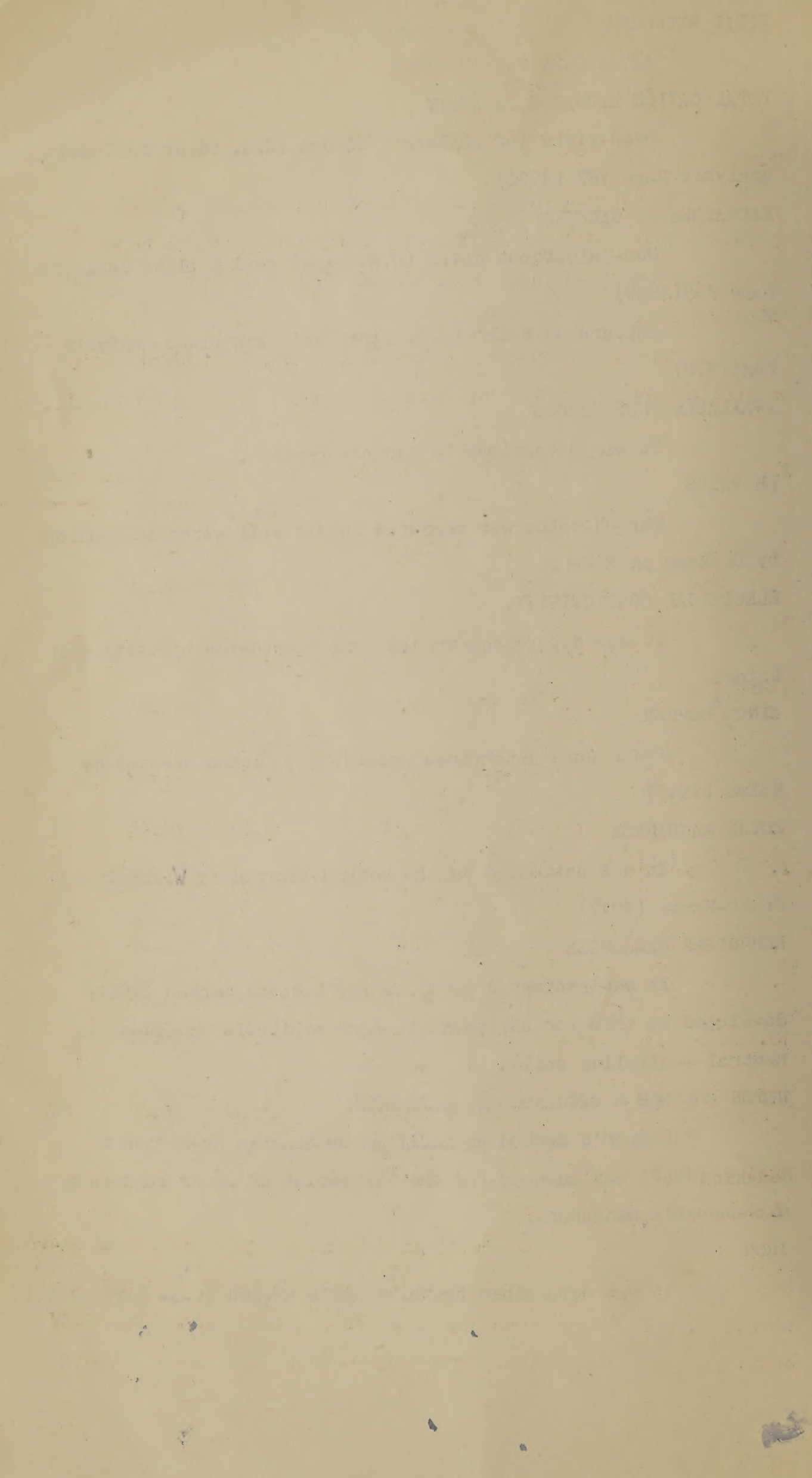
It was estimated by Jones and Leepers method (1951) developed by them for the estimation of available manganese in neutral & alkaline soils.

WATER SOLUBLE & EXCHANGEABLE MANGANESE

Leeper's method as modified by Shorman Mc-Hargue & Hodgkiss (1942) was adopted for the estimation of water soluble & exchangeable manganese.

IRON

It was determined by thiocyanate method (C.S. piper 1950)



R E S U L T S

FIELD EXPERIMENTS

Six replicated experiments were conducted on wheat, Berseem and Tea at Paprola (Kangra) & Gurdaspur. The results of these experiments are discussed in the following pages.

WHEAT (PAPROLA)

The experiment was laid out in randomised block design on Goel's Farm, Paprola. The results are given in Table No. 1

TABLE 1

Treatment	Av. yield in mds. per acre.		Increase in yield over control	
	Grain	Straw	Grain	Straw
1. Control	+ 1.3 71.08	+ 8.4 24.08	-	-
2. N @ 60 lbs nitrogen per acre.	14.87	36.15	3.79	12.07
3. NP @ 60 lbs nitrogen & 60 lbs P ₂ O ₅ P.A.	18.07	42.86	6.99	18.78
4. NK @ 60 lbs nitrogen & 90 lbs K ₂ O P.A.	15.67	36.92	4.59	12.84
5. NPK @ 60 lbs nitrogen 60 lbs P ₂ O ₅ & 90 lbs K ₂ O P.A.	20.19	56.47	9.11	32.39
6. NPK + Borax 10 lbs P.A.	26.69	66.50	15.61	42.42
7. NPK + Copper sulphate 10 lbs P.A.	25.79	61.04	14.71	36.96
8. NPK + Manganese sulphate 50 lbs P.A.	26.32	67.04	15.24	42.96
9. NPK + Ammonium Moly- bdate 2 lbs P.A.	21.88	59.63	10.80	35.55
10. NPK + Zinc sulph- ate 30 lbs p.a.	28.58	69.15	17.50	45.07
11. NPK + Micronutrients (6-10)	24.04	62.68	12.96	38.60
L.S.D. at 1%	3.58	23.10		
L.S.D. at 5%	2.65	17.14		

A perusal of data shows, that different micro-nutrients when applied along with NPK increased the yield of wheat grain and Straw from 10.80 to 17.50 mnds and 35.55 to 45.07 mnds. per acre respectively over the control. With the exception

of molybdenum all other micronutrients were responsible for significant yield increase over NPK alone. Although combination of different micronutrients with NPK had a marked effect on the yield of straw but the increased yield was not significantly higher than in NPK treatment. Maximum increase in the yield of grain had been brought about by the application of Zinc alongwith NPK followed by boron, manganese and copper and these micronutrients significantly exceed the application of molybdenum. Differences between Zinc, boron, Manganese & copper are non significant. A combination of all these micronutrients had a depressing effect on the yield of wheat as compared to their single application with the exception of Molybdenum. It shows that it is not a sound practice to add a group of micronutrients in experiments because some of the micronutrients may be counter-acting the effects of others.

It was also observed that Boron, Zinc, Manganese and Copper caused early earing (maturity) of wheat. This year the residual effect of the micronutrients is being studied on maize.

WHEAT (GURDASPUR)

Two experiments along the similar lines as mentioned in the case of above experiment were laid out at Gurdaspur Agricultural Station. In the first experiment the dose of NPK was 40:20:20 lbs per acre, where as in the 2nd experiment the dose of NPK was increased to 60:30:30 per acre, just to see if there would occur deficiency of micronutrients at higher level of major elements. The results of these experiments are given in Tables 2 & 3.

TABLE 2

Treatment	Av. yield in mnds. per acre.		Increase in yield over control	
	Grain	Straw	Grain	Straw.
1. Control.	+1.19 13.56	+ 2.69 33.46	-	-
2. N@ 40 lbs ^{nitrogen} per acre	17.80	54.45	4.24	20.99
3. NP@ 40 lbs nitrogen	18.87	54.55	5.31	21.09
& 20 lbs P ₂ O ₅ P.A.				
4. NK @ 40 lbs nitrogen	22.17	57.85	8.61	24.39
& 20 lbs K ₂ O P.A.				

NPK @ 40 lbs nitrogen 20 lbs P ₂ O ₅ + & 20lbs K ₂ O P.A.	23.00	57.85	9.44	24.39
6.NPK +Copper sulphate 10lbs p.A. 23x	23.15	56.05	9.59	22.59
7 .NPK+Manganese sulphate 50lbs P.A.	22.37	60.95	8.81	27.49
8 .NPK+Ferrous sulphate (chelated) 10lbs P.A.	21.35	55.38	7.79	21.92
9 .NPK +Zinc sulphate 30lbs P.A.	20.26	55.64	6.70	22.18
10.NPK + Micronutrients (6 - 9)	19.17	59.55	5.61	26.09

	Grain	Straw
L.S.D.at 1%	3.296	7.71
L.S.D. at 5%	2.44	5.69

It can be observed from the above table, that with the exception of copper, all other micronutrient treatments had a depressing effect on the yield of wheat as compared to application of NPK alone. Among different micronutrients application of copper had significantly out weighed the combined application of all micronutrients and single application of zinc at 5% level. The differences between these two treatments ^{were} non significant. Copper, Iron & Manganese stand at par with one another. Although combined application of all micronutrients had a most depressing effect on the yield of wheat grain, but it ^{exceeded} all other treatments except manganese as far as the effect on the yield of wheat straw was concerned. In this soil the response to nitrogen and potassium were very marked which show that these elements were not present in adequate amounts in this soil.

TABLE NO 3

Treatment	Av. yield in mnds per acre.		Increase in yield over control.	
	Grain + 1.09	Straw + 3.98	Grain	Straw
1. Control	12.63	35.31	-	-
2. N @ 60 lbs nitrogen P.A.	20.57	65.22	7.94	29.91
3. NP @ 60 lbs nitrogen & 30lbs P ₂ O ₅ P.A.	20.00	55.88	7.37	20.57

4. NK @ 60 lbs nitrogen & 30 lbs K ₂ O P.A.	23.82	62.80	11.19	27.49
5. NPK @ 60lbs nitrogen, 30lbs P ₂ O ₅ & 30lbs K ₂ O p.A.	23.51	62.28	10.88	26.97
6. NPK+Copper sulphate 10 lbs P.A.	22.58	59.92	9.95	24.61
7. NPK+Manganese sulphate 50lbs P.A.	24.50	65.42	11.87	30.11
8. NPK +Ferrous sulphate (Chelated) 10lbs P.A.	24.49	63.10	11.86	27.79
9. NPK+Zinc sulphate 30lbs P.A.	23.93	61.88	11.30	26.57
10. NPK+Micronutrients (6-9)	23.15	59.38	10.52	24.07
11.				
	Grain	Straw		
L.S.D. at 1%	3.02	11.03		
L.S.D at 5%	2.24	8.16		

The perusal of data reveals that application of different micronutrients along with higher dose of NPK had a more favourable effect on the yield of wheat as compared ^{to} their application along with lower dose of NPK. The differences between different micronutrients were non significant and all of them when applied alone or in combination stand at par with the application of NPK alone. In this experiments also application of nitrogen and potassium have given the maximum response and appear to be the main limiting factors for wheat growth in this soil. Further investigation are in progress to throw more light on this problem.

BERSEEM (GURDASPUR)

Two experiments were laid out at Gurdaspur Agricultural Station in randomised block design to study the effect of micronutrients sprays along with two levels of NPK viz. (50:50:50: & 100:100:100) on the yield of berseem. The results are given in table No _____ 4 & 5

TABLE-IV

S. No.	Treatment	Average yield (Green Fodder) in Mds per acre.	Increase in yield Mds per acre.
		+46.60 525.95	-
1.	Control		
2.	N @ 50 Lbs nitrogen P ₂ A.	540.66	14.71
3.	P @ 50 Lbs P ₂ O ₅ P.A.	556.66	30.71
4.	NP @ 50 Lbs nitrogen & 50 Lbs P ₂ O ₅ P.A.	629.33	103.33
5.	NK @ 50 Lbs nitrogen & 50 Lbs K ₂ O P.A.	532.66	6.71
6.	NPK @ 50 Lbs nitrogen, 50 Lbs P ₂ O ₅ & 50 Lbs K ₂ O P.A.	615.66	89.71
7.	NPK + Borax *	590.66	64.71
8.	NPK + Molybdenum	565.33	39.33
9.	NPK + Copper	620.00	94.05
10.	NPK + Zinc	654.60	128.65
11.	NPK + Iron	587.33	61.33
12.	NPK + Manganese	627.94	101.99
13.	NPK + Micronutrients (7 to 12)	546.11	20.16
	L.S.D. at 5%	96.18	
	L.S.D. at 1%	130.34	

* First spray of micronutrients was done when the crop was one month old and subsequent sprays were done after taking each cutting of the berseem fodder and doses were as under:-

- I. Manganese sulphate 10 lbs + 5 Lbs hydrated lime in 100 gallons of water.
- II. Zinc Sulphate 5 lbs + 2½ Lbs hydrated lime in 100 gallons of water.
- III. Copper Sulphate 2½ Lbs + 2½ Lbs hydrated lime in 100 gallons of water.
- IV. Ferrous Sulphate 2½ Lbs + 1½ Lbs hydrated lime in 100 gallons of water.
- V. Borax 4 oz in 100 gallons of water.
- VI. Ammonium Molybdate one oz in 100 gallons of water.

From / these results it appears that only Zinc and Manganese sprays have given significant yield increased over the control.

The differences in yield due to different micronutrients and other treatments are non-significant among them-selves. Sprays of zinc, manganese and copper with a basal dressing of NPK have increased the yield of berseem by 38.94, 12.28 and 4.34 Mds per acre respectively as compared to NPK alone. Sprays of Boron, Iron, Molybdenum and all micronutrients depressed the yield by 25.00, 28.33, 50.33 and 68.55 Mds respectively over NPK treatment.

TABLE -V.

S. No.	Treatment	Average yield (Green Fodder) in Mds per acre.	Increase in yield Mds per acre.
		±47.61	-
1.	Control.	519.28	-
2.	N @ 100 Lbs nitrogen P.A.	610.00	90.72
3.	P @ 100 Lbs P ₂ O ₅ P.A.	583.28	64.00
4.	NP @ 100 Lbs nitrogen & 100 Lbs P ₂ O ₅ P.A.	592.00	72.72
5.	NK @ 100 Lbs nitrogen & 100 Lbs K ₂ O P.A.	648.61	129.33
6.	NPK @ 100 Lbs nitrogen, 100 Lbs P ₂ O ₅ and 100 Lbs K ₂ O P.A.	614.61	95.33
7.	NPK + Borax *	643.27	123.99
8.	NPK + Molybdenum	624.00	104.72
9.	NPK + Copper.	672.60	153.32
10.	NPK + Zinc	651.27	131.99
11.	NPK + Iron.	686.60	197.32
12.	NPK + manganese	644.00	124.72
13.	NPK + micronutrients (7-12)	622.61	103.33
	L.S.D. at 5%.	98.25	
	L.S.D. at 1%	133.14	

* Doses of micronutrient are the same as in the last experiment on berseem.

It is quite evident on comparison of the yield data of two experiments on berseem that the effect of micronutrients is more pronounced in the case of higher basic dose of NPK. Application of all micronutrient has given significantly increased yields of berseem green fodder over the control at 5% level.

Among different micronutrients, the differences in increased yields are non significant. Highest response is due to Iron followed by Zinc, Copper, Manganese, Boron, Molybdenum and combination of all micronutrients. Yield increases due to micronutrients over NPK alone, are statistically non significant.

TEA PALAMPUR

This experiment was laid out in a randomised block design at Sungal Tea Estate Palampur. A row consisting of 35 bushes was selected for each treatment. The average results of 4 repeats are given in Table No. 6.

TABLE VI.

S.No.	Treatment	Average yield in Lbs per row.	Increase or decrease per row.
1.	Control.	34.24	-
2.	N @ 120 Lbs nitrogen P.A.	33.89	-0.35
3.	NP @ 120 Lbs nitrogen and 60 Lbs P ₂ O ₅ P.A.	32.44	-1.80
4.	NK/120 Lbs nitrogen & 120 Lbs K ₂ O P.A.	33.44	-0.80
5.	PK @ 60 Lbs P ₂ O ₅ and 120 Lbs K ₂ O.P.A.	33.83	-0.41
6.	NPK @ 120 Lbs nitrogen, 60 Lbs P ₂ O ₅ and 120 Lbs K ₂ O P.A.	36.92	+2.68
7.	NPK + Zinc Sulphate 30 Lbs P.A.	32.37	-1.87
8.	NPK + Copper Sulphate 10 Lbs P.A.	34.18	-0.06
9.	NPK + Manganese Sulphate 50 Lbs P.A.	34.96	+0.72
10.	NPK + Ammonium Molybdate 2 Lbs P.A.	32.25	-1.99
11.	NPK + Borax 10 Lbs P.A.	36.79	+2.55
12.	NPK + all micronutrients (7 to 11)	34.01	-0.23

The experiment is in progress since January, 1958. The above results are the averages of first four pickings from four repeats which are to continue till the middle of September. The results of first four pickings show that so far none of the treatments had any effect in increasing the yield of Tea green leaves. The experiment is however in progress and it is yet too early to conclude any thing.

PART -B

INVESTIGATIONS OF THE CAUSES RESPONSIBLE FOR THE CHLOROTIC CONDITION OF CITRUS TREES IN PUNJAB.

During the year under report numerous complaints

regarding the chlorotic condition of citrus trees were received from fruit growers through out the State. There is hardly any garden in the State which is altogether free from this disease. In several cases the plants die and the garden presents a deserted look. In milder forms a solitary twig may be affected and a few mature leaves may have small light green intervenal areas with midrib and lateral veins remaining dark green. While in advanced stages the chlorotic area gradually increases and the whole of leaf may look yellow. When the condition is acute, the growth is usually checked and the entire out side of the tree bears fine short twigs carrying narrow small leaves on their lower portion. The upper portion is devoid of leaves and the shoot has a tendency to dry up from growing point downward. In some of the trees the new growth of the leaves is usually thin with a very fine net work of veins on a much lighter (Plae green) background. Fruit bearing capacity of chlorotic ^{plant} is also adversely affected and the fruits are generally small sized and malformed which are shed off before ripening. In some of the orchards, a few chlorotic trees were also found to be suffering from foot rot. In order to find out if this chlorosis could be due to defective soil condition and deficiency of some of the nutrients, the problem is being investigated on the following lines:-

- i. Analysis of soil profiles supporting healthy and chlorotic plants.
- ii. Analysis of healthy and chlorotic citrus leaves.
- iii. Effect of soil application of micronutrients on the incidence of chlorosis.

i. Analysis of soil profiles supporting healthy and Chlorotic Plants.

16 Soil profiles were exposed at the bases of healthy and chlorotic plants at Jassur (Kangra) JamalPur, Gurdaspur, Qadian, Jullundur, Ludhiana, Abohar and Sarai Naga (Ferozepur).

96 Soil samples were collected from these profiles. Out of these 56 soil samples representing 10 profiles were analysed and results are given in table Nos 7 to 9.

TABLE-VII

Description.		Texture.	PH 1:2 suspension.	Electric conducti vity 1:2 Suspension mm/cm	Calcium Carbon ate %	Organic Carbon %
Attari garden	0-6"	Clay Loan	7.55	0.25	0.25	0.480
Profile No. 3	6-12"	Clay Loan	7.65	0.20	Nil	0.340
Normal plant.	12-24"	Clay	7.30	0.12	Nil	0.225
	24-45"	Clay	7.45	0.12	Nil	0.195
	45-60"	Clay	7.90	0.17	0.125	0.165
	60-72"	Clay	8.00	0.18	3.00	0.165
Profile No. 4	0- 6"	Clay Loan	7.35	0.72	0.38	0.660
Chlorotic	6-12"	Clay Loan	7.90	0.52	0.25	0.330
Plant.	12-24"	Clay	7.60	0.23	Nil	0.180
	24-36"	Clay	7.60	0.24	Nil	0.180
	36-44"	Clay	7.70	0.23	Nil	0.180
	44-50"	Clay	8.10	0.34	0.38	0.165
	50-60"	Clay	8.20	0.15	3.00	0.150
	60-72"	Clay	8.35	0.20	3.75	0.150
Profile No. 5	0- 6"	Loamy Clay	7.40	1.80	0.125	0.465
Chlorotic	6-12"	Clay	7.50	0.87	Nil	0.270
Plant.	12-36"	Clay	8.00	0.90	Nil	0.210
	36-51"	Clay	7.50	0.30	Nil	0.188
	51-60"	Clay	7.90	0.50	0.375	0.210
Profile No. 6	0- 6"	Clay Loan	7.70	1.48	0.125	0.480
Chlorotic	6-12"	Clay Loan	7.50	2.70	Nil	0.270
Plant.	12-36"	Clay	7.30	1.70	Nil	0.225
	36-51"	Clay	7.30	1.50	0.125	0.303
	51-60"	Clay	7.85	0.35	0.25	0.180
Abohar Garden	0-18"	Sandy Loan	8.10	0.18	3.00	0.225
Profile No. 1	18-36"	Loan	8.20	0.15	13.00	0.180
Normal Plant.	36-72"	Clay Loan	8.05	0.30	18.00	0.165
Profile No. 2	0-18"	Loamy sand	7.90	0.26	3.50	0.188
Chlorotic	18-48"	Sandy Loan	7.90	0.30	11.00	0.173
garden.	48-72"	Loan.	7.80	0.37	17.00	0.150

Perusal of data in table No. 7 reveals that soluble salts are invariably present in larger amounts in the soil profiles supporting chlorotic plants. The electrical conductivity in 1:2 soil suspension in most of the soil samples from profiles bearing chlorotic plants is more than 0.3 millimhos/cm. It appears that where electrical conductivity of the 1:2 suspension in the root zone of the soil profile (usually 12"-48") is above this critical limit, the health of the plant is adversely affected. Therefore it seems that besides other causes, the most common cause responsible

for chlorosis of citrus in many gardens in Amritsar, Ludhiana & Ferozepur district is high salt concentration. It will not be out of place to mention that this degree of salinity may not be harmful for most of the arable crops but citrus being very sensitive suffers from it. There are indications that high PH also accentuates it.

Soil samples collected from two profiles of Attari Garden where the soluble salts are not so high as to adversely affect the growth of plants, were subjected to detailed analyses. These results (Table No. 8) show that there is no appreciable difference in their characteristics such as PH, Calcium Carbonate, Organic matter, texture, total manganese, copper, zinc, exchange capacity and exchangeable calcium except available phosphorous and exchangeable manganese both of which are high in the soil bearing chlorotic plants. In the case of Jogiana soil profiles (Table No. 9) the soil from the site of chlorotic plants is deficient in organic matter, has greater electrical conductivity and high amounts of available phosphorous. It appears that higher amount of available manganese in the profiles supporting chlorotic plants has disturbed the balance between, manganese and iron, manganese and copper and manganese and zinc in the soil solution and in the plant itself. Higher availability of phosphorous in the soil in the root zone of chlorotic plants, appears to have adversely affected the uptake of zinc and probably of iron and copper on account of their precipitation as phosphates.

ii. Analysis of Healthy and Chlorotic leaves.

60 samples of healthy as well as chlorotic citrus leaves were collected from the gardens mentioned in the preceding paragraphs. Seven samples from Jogiana (Ludhiana) and Attari have been analysed (Table No. 10) for total copper, manganese, zinc, iron, phosphorous, and potassium. Analysis of leaf samples also lend support to the above contention as manganese is more and zinc and copper are less in the chlorotic leaves as compared to the healthy ones. It seems that there is severe

Description.	TABLE VII																
	Mechanical Analysis. Percentages on Air dry basis.			Fine Sand.	Org. Carbon	Ca Co ₃	Nit. roge n	Conduc tivity 1:2 Sus.	PH	Av. P ₂₀₅	Ex. Cap. M.E.	Ex. Ca. M.E.	Parts Copper	per million. Zinc	Mn.	Ex. Mn.	
Clay.	Silt	Course sand.			%	%	%					%	%				
Attari Garden Profile No. 1 Normal plant.	0-6" 6-12" 12-24" 24-36" 36-48" 48-60" 60-72" 72-84"	25.00 31.20 34.26 36.00 39.94 33.86 30.42 27.04	32.00 37.20 30.22 33.24 39.94 29.42 23.20 25.06	2.08 1.26 0.72 0.99 0.46 0.32 1.02 0.32	40.39 39.84 34.54 27.53 32.75 26.16 45.15 46.44	0.525 0.315 0.255 0.240 0.225 0.225 0.210 0.135	Nil " " " " " " "	0.089 0.079 0.079 0.066 0.057 0.057 0.051 0.043	0.14 0.15 0.10 0.15 0.13 0.12 0.12 0.12	8.00 7.95 7.85 7.75 7.50 7.60 7.80 7.80	Low " " " Med. M. High Low "	20.3 20.5 20.8 22.0 21.4 20.0 15.7 16.8	11.7 12.4 11.9 13.0 13.6 11.0 9.9 9.0	31.25 33.75 34.38 35.00 32.50 26.88 40.00 28.75	78.75 83.75 90.00 91.25 97.50 73.75 72.50 72.50	687 719 734 844 625 600 906 875	3.75 3.00 0.75 2.32 1.50 traces " 1.25
Profile 2 Chloro tic Plant.	0-6" 6-12" 12-24" 24-36" 36-48" 48-60" 60-72"	21.08 30.14 31.44 33.08 31.22 26.32 27.82	34.52 30.12 30.44 33.68 31.24 30.60 23.90	22.79 2.09 2.74 3.38 3.99 7.15 7.14	40.79 37.11 34.99 30.50 33.21 35.62 40.91	0.495 0.315 0.225 0.210 0.195 0.180 0.135	Nil " " " " " "	0.087 0.073 0.066 0.061 0.053 0.050 0.043	0.15 0.22 0.22 0.22 0.21 0.14 0.11	7.60 7.80 7.80 7.85 8.00 7.75 7.60	High " " " " " "	16.1 15.0 15.8 15.6 13.8 13.8 12.4	10.4 10.5 10.7 10.6 10.7 10.0 9.0	34.38 25.31 23.75 20.63 23.75 27.50 32.50	81.50 90.00 87.50 82.50 105.00 112.00 75.00	550 650 625 595 612 575 550	22.50 16.26 5.25 1.875 3.50 1.875 2.25

Description.	Organic Carbon %	CaCO ₃ %	PH	Electric Conducti- vity millymhos/ 1:2 suspension.	TABLE -IX		Exchange- able K ₂ O M.E. 100 gm ppm	Exchange- able manganese	Water soluble salts. NaCl %	Na ₂ CO ₃ %	NaHCO ₃ %
					Available P ₂ O ₅						
Jugiana Garden Profile Normal Plant.	0-6" 0.675 6-14" 0.233 14-38" 0.218 38-56" 0.183	0.175 Traces 0.125 0.125	7.85 7.80 8.00 8.00	0.325 0.225 0.250 0.225	119 11 9 25	0.29 0.16 0.13 0.20	9.85 1.30 0.60 0.50	0.0366 0.0082 0.0053 0.0073	Nil " " "	0.092 0.059 0.067 0.042	
Max. root Zone.	24-27" 0.225	Traces	7.75	0.100	11	0.18	0.50	0.0088	"	0.050	
Profile 2 Chlorotic Plant.	0-6" 0.255 6-12" 0.233 12-24" 0.225 24-36" 0.225 36-48" 0.188	Nil " " " "	6.40 7.20 7.30 7.45 7.50	1.900 0.375 0.420 0.400 0.300	31 28 39 56 55	0.42 0.30 0.18 0.16 0.35	3.50 1.25 0.50 0.75 0.50	0.0094 0.0146 0.0193 0.0111 0.0105	Nil " " " "	0.039 0.028 0.021 0.016 0.015	
Max. Root Zone.	15-18" 0.248	"	7.55	0.600	25	0.47	0.50	0.0135	"	0.063	

.....

TABLE -X

Description	Percent in over dry basis.		Parts per million on over dry basis.			
	<u>Phosphorus</u>	<u>Potassium</u>	<u>Copper</u>	<u>Manganese</u>	<u>Zinc</u>	<u>Iron.</u>
	(12.05)	(120)				
<u>GOVERNMENT GARDEN ATTARI (DISTRICT AMRITSAR).</u>						
1. Grape fruit normal leaves.	-	-	19.38	56.25	29.69	-
2. Grape fruit chlorotic leaves.	-	-	16.00	71.88	14.06	-
<u>JUGIANA GARDEN COLONY (DISTRICT LUDHIANA).</u>						
1. Sweet orange normal leaves.	0.634	2.89	15.00	7.50	16.25	100.00
2. -----do-----	0.592	5.95	13.75	17.50	20.00	71.50
3. -----do-----	0.615	40.09	13.75	23.50	15.63	85.00
4. Sweet orange chlorotic leaves	0.445	3.94	7.50	15.00	2.50	64.50
5. -----do-----	0.584	5.05	7.50	33.75	Traces	64.50

deficiency of zinc and probable deficiency of copper and iron in the chlorotic plants. These preliminary studies indicate that there may be number of other causes responsible for chlorotic condition of citrus in the punjab but major ones seem to be high salinity and deficiency of zinc, copper and iron. Further investigations are in progress.

iii. Effect of micronutrients on the incidence of chlorosis.

One experiment to study the effect of the applications of various nutrients on the incidence of chlorosis was laid out at Government fruit Garden Abohar. Soil application of different micronutrients was done in the month of March. The observation as to the total number of leaves chlorotic leaves, green leaves, small sized leaves and leaves with mid rib yellow on selected twigs were recorded in the month of March and again in the

month of July, 1958. Average results of three repeats of the incidence of chlorosis are given in Table 11. table No. 11
Table No. XI.

S. No.	Treatments	% average incidence of chlorosis in March	Percent average incidence of chlorosis in July.
1.	Control	35.38	4.08
2.	NPK	27.68	1.26
3.	NPK + Manganese Sulphate.	49.51	28.60
4.	NPK + Ferrous sulphate (Chelated)	39.45	1.50
5.	NPK + Manganese Sulphate + Ferrous Sulphate chelated	43.85	41.99
6.	NPK + Copper Sulphate.	50.43	12.69
7.	NPK + Zinc Sulphate	48.11	12.64
8.	NPK + Copper Sulphate + Zinc Sulphate.	42.76	8.59
9.	NPK + Copper + Zinc + manganese + chelated iron	54.93	6.86
10.	NPK + manganese + Zinc + Chelated Iron.	52.43	20.29

It is quite evident from the results that there has been marked recovery in the percentage of chlorotic leave during the month of April May, and June. Application manganese sulphate of

appears to have^a depressing effect on the recovery of chlorotic leaves. Different treatments do not seem to have affected the incidence of chlorosis much.

3.

PART-C

MICRONUTRIENT SURVEY

Six soil profiles were exposed and 31 soil samples were collected from Mahali, Katrain, Kulu and Palampur to study the distribution of different micronutrients in these soil samples. Out of these three soil samples from one profile of Palampur have been analysed for various macro and micro constituents. Analysis results are given in table No.12 . It is quite evident from the analysis results that total manganese, copper and Zinc in this profile ranges between 586 and 587 p.p.m, 17.5 and 25.0 p.p.m and 60.0 and 62.50 p.p.m respectively. Water soluble, Exchangeable, reducible and active forms of manganese vary from 1.50 to 2.25 p.p.m, 3.6 to 20.0 p.p.m, 146 to 258 p.p.m and 150.90 to 280.25 p.p.m respectively. Analysis results indicate that these soil samples contain moderate to high amounts of total copper and Zinc and different forms of manganese.

The analysis of soil samples from other profiles for their macro and micro constituents has also been taken in hand.

SECTION -D DEVELOPMENT OF INITIATIVE AND LEADERSHIP AMONG SENIOR AND JUNIOR RESEARCH WORKERS.

The work has been conducted under the guidance and supervision of Dr. J.S. Kanwar who is responsible for planning, guiding and interpretation of research work. The Analytical Chemist Shri Narinder Singh Randhawa has shown great initiative in carrying out the programme of work of the scheme. He is responsible for all the analytical work and lay out of field experiments. The field Assistant Shri Sat Pal has joined this section only recently and is familiarising himself with the work of the scheme. He has however been helpful in conducting the field experiments.

SECTION E REMARKS OF THE SCIENTIFIC COMMITTEES & ACTION TAKEN THEREON.

This is the first report which is being submitted to I.C.A.R.

S.No.	<u>TABLE - XII</u>		
	<u>I</u>	<u>II</u>	<u>III</u>
Location	<u>Palampur(Kangra)</u>	<u>Palampur(Kangra)</u>	<u>Palampur(Kangra)</u>
Description	0-8"	8-18"	18-30"
Clay %	13.40	14.56	16.00
Silt %	20.36	21.00	25.56
Course sand %	11.82	9.32	9.68
Fine sand	52.71	52.23	47.66
Texture.	Sandy loam	Sandy Loam	Sandy Loam
Colour	Dark Gray	Dark Gray	Dark Gray
Organic Carbon %	1.365	1.215	0.976
Nitrogen. %	0.162	0.162	0.134
CaCO ₃	Nil	Nil	Nil
Available P ₂ O ₅	Low	Low	Low
Electrical conductan cf. 1:2 suspension millimhos/cm.	Less than minimum Less than minimum less than minimum.		
PH 1:2 suspension	5. 75	5. 80	6. 00
Exchangeable capacity of M.E. 100 gm. soils.	15. 70	14. 90	15. 30
Exchangeable calcium M.E. 100 gm. soils	7. 30	5. 30	5. 10
Total Copper(p.p.m)	25.00	17.50	22.50
Total Zinc(p.p.m)	62.50	60.00	60.00
manganese(p.p.m)	687	536	629
Reducible manganese (p.p.m)	258	146	200
Exchangeable manganese (p.p.m)	20.00	3. 60	5.00
Water soluble mn. (p.p.m)	2.25	1.50	1.75
Active mn. (p.p.m)	280.25	150.90	206.75

therefore the remarks under this head are blank.

SECTION-E SUMMARY

The scheme was sanctioned for a period of three years from 1.4.56 to 28.2.1959. The research work of the scheme could not be started till 10.10.57 as none of the staff sanctioned in this scheme was employed till this date. The post of one field assistant and a laboratory attendant have not been filled so far. This being the first year of the scheme analytical chemist, remained busy in setting up his laboratory. The research work carried out during the period has been discussed under the following headings.

- a. Field Experiments.
- b. Study of the causes responsible for chlorotic condition of citrus tree in Punjab.
- c. Micronutrient survey.

Field Experiments. Six replicated experiments in randomized block design were laid out on wheat, tea and berseem at Paprola palampur and Gurdaspur. Application of zinc, copper manganese and boron gave significant yield increases of wheat over NPK treatment at Paprola. The responses to the application of micronutrients to wheat were not so favourable at Gurdaspur. Among different micro-nutrients only copper could excell NPK treatment at its lower level (40:20:20) where as zinc, manganese and iron gave higher yield than NPK at its higher level (60:30:30), but the yield increases were non significant. In the case of experiments on berseem, single applications of all micronutrients with higher level of NPK (100:100:100) gave significantly higher yields of berseem green fodder over the control treatment but with lower level of NPK (50:50:50) only zinc and manganese could significantly excell the control. In both these experiments the differences between various micronutrients and NPK treatment were non significant. From all these experiments it has been seen that it is not a sound practice to add a group of nutrients ⁱⁿ experiments, these invariably depressed the yield as compared to single application of these nutrients. It appears that some of the micronutrients are ^{ne} contracting the effects of others.

Experiments have also been laid out at Palampur, Gurdaspur Ludhiana and Amlekh (Patiala) to study the effect of micronutrient on maize.

Study of the causes responsible for chlorotic condition of citrus trees in Punjab.

96 Soil samples were collected from 16 profiles exposed in the gardens exhibiting chlorosis of citrus trees and out of these 56 soil samples from 10 profiles were analysed for various macro and micro nutrients. 60 samples of healthy as well as chlorotic citrus leaves were also collected from these gardens and out of these 7 leaf samples have been analysed for various macro and micro nutrients. The preliminary investigations indicated

i. ⁸⁶ The electrical conductivity which is a measure of salt content in 1:2 soil suspension exceeds 0.30 m.mhos/cm the plants begin to suffer from chlorosis.

ii. Deficiency of zinc and probably that of iron and copper appears to be responsible for the chlorotic conditions.

iii. Higher availability of manganese and phosphorous and disturbance ⁸⁶ other soil conditions such as very low organic matter nitrogen and poor aeration seems to upset the balance between different nutrient.

Micronutrient survey.

31 soil samples were collected from 6 profiles exposed at Manali, Katrain, Kulu and Palampur. Three soil samples from one profile were analysed for various macro and micronutrients. Analysis results indicate that these soil samples contain moderate to high amounts of total copper and zinc and different forms of manganese.

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VII
KELLOGG

REPORT
of the
AGRICULTURAL ADMINISTRATION
COMMITTEE



सत्यमेव जयते

MINISTRY OF FOOD & AGRICULTURE
(DEPARTMENT OF AGRICULTURE)

GOVERNMENT OF INDIA
OCTOBER 1958

REPORT
of the
AGRICULTURAL ADMINISTRATION
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OCTOBER 1958

REPORT
of the
AGRICULTURAL ADMINISTRATION
COMMITTEE

*At the head of all sciences and arts,
At the head of civilisation and progress,
Stand not militarism, the science that kills;
Not commerce, the art that accumulates;
But agriculture, the mother of all industries,
And the maintainer of human life.*

D.O. No.5(6)/58-NC
AGRICULTURAL ADMINISTRATION COMMITTEE
Ministry of Food & Agriculture
Government of India

New Delhi, October 27, 1958.

Dear Shri Damle,

The Report of the Agricultural Administration Committee, appointed by the Government of India in Department of Agriculture letter No. 3-35/57-GMF (Co), dated 28th February, 1958, is submitted herewith.

Yours sincerely,
Surendra Singh Nalagarh
J. S. Patel
J. V. A. Nehemiah
K. Sachidanandam
R. N. Mathur

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Dr. R.N. Mathur (*Member-Secretary*),
Deputy Agricultural Commissioner,
Ministry of Food and Agriculture.

COOPTED MEMBERS

Secretary to Government-in-charge Agriculture,
Director of Agriculture
&
Registrar Cooperative Societies
of the States visited.

THE HISTORY

OF THE
CITY OF
NEW YORK

THE HISTORY

OF THE
CITY OF
NEW YORK

FROM THE
FIRST SETTLEMENT
TO THE PRESENT

BY
JOHN B. HENRY

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CHAPTER I

INTRODUCTORY

Appointment of the Committee.

1.1 At the Conference of State Ministers of Agriculture, held in Srinagar in October, 1957, it was observed that serious delays in the execution of several agricultural production schemes in the States were due to administrative complexities and over-centralization of powers both administrative and financial. The Conference suggested that the Central Government should set up a committee, consisting of experts and administrators, both from the Central and State Governments, which should visit four or five States and recommend for the consideration of the State Governments a model agricultural organization in the States, as well as measures for the delegation of powers to agricultural officers at all administrative levels. The Government of India, in accordance with the recommendation of the Conference of State Ministers of Agriculture appointed a committee to make recommendations on the lines of the resolution passed at the Srinagar Conference (Appendix I).

Terms of Reference.

1.2 The terms of reference of the Committee as communicated in Government of India's letter No. 3-35/57-GMF (Co), dated 28th February, 1958 are given below:—

- (i) to suggest simplification of administrative and financial procedures in order to expedite the implementation of agricultural production schemes; and
- (ii) to suggest a model agricultural organization in the States, along with suggestions for delegation of suitable powers at various levels in the States, so that agricultural production schemes may be carried out speedily.

Both the terms of reference have been taken together in this report.

1.3 On a clarification sought by the Committee (Appendix II), the Government of India informed the Committee that it need not go into the working of Animal Husbandry and Forest Departments of the States as this was likely to cause delay in the finalization of the Report. It was

felt that the procedures required close examination and may differ from those prevailing in the agriculture departments. It was, however, stated that once the Report of the Committee was received, an examination could be made if the recommendations in respect of agricultural production programmes could apply also to Animal Husbandry and Forest Departments. In view of this, the Committee confined itself to an examination of the working of State Agriculture Departments only.

Programme of work.

1.4 The Committee held its first meeting on 8th March, 1958 when the plan of work was discussed. At this meeting it was also decided to issue a Questionnaire (Appendix III), which was sent to the State Governments. The Committee decided to visit a few selected States, beginning with the 9th May with a view to obtaining first hand knowledge of the local problems and the difficulties experienced by the workers at all levels in the State Departments of Agriculture. The States visited were Assam, Bombay, Bihar, Punjab, Andhra Pradesh and Madras. Among Union Territories, Himachal Pradesh was selected for the visit of the Committee.

1.5 In the course of these visits, the Committee took the opportunity of meeting the staff employed at all levels in the Agriculture and Community Development Departments from the Village Level Worker and the Agriculture Inspector, right upto the Development Commissioner and the Director of Agriculture, for free and frank discussions of their difficulties and needs. Wherever possible, the Committee had the privilege of meeting the State Ministers incharge of Agriculture. The Andhra Pradesh Government set up an ad-hoc Committee consisting of official and non-official members of the State Farmers' Association to examine and reply to the Questionnaire issued by the Committee. While in Andhra Pradesh, the Committee also met this ad-hoc Committee set up by the State Government. The Committee completed its visits to the States on 14th September, 1958 and met in New Delhi from 20th September to 8th October, for finalising the report. The Draft Report of the Committee was also considered by the representatives of all the State Governments at a meeting held at New Delhi from 11th to 13th October and their views and suggestions have been incorporated wherever found necessary.

1.6 Shri J. V. A. Nehemiah, Extension Commissioner in the Ministry of Food and Agriculture, Department of Agriculture, joined the Committee in April, 1958, immediately after Dr. R.J. Kalamkar's departure to join the Madhya Pradesh Department of Agriculture, as Director of Agriculture. Shri M.L. Wilson of the Ford Foundation was available for preliminary

discussions but could not accompany the Committee on its tours to the States due to weak health. He proceeded to the United States of America in May, 1958.

The Problem and the task ahead.

1.7 In all its meetings with State officials, the Committee invited frank and open discussions and an assurance was given that no individual or State would be quoted in the report. Keeping in mind the terms of reference assigned, the Committee was as anxious to study the darker side of the picture as the brighter one, and such an assurance in the Committee's opinion, helped to achieve this objective.

1.8 Throughout its tour in the States and in discussions held at all levels, with research workers and teachers in agricultural institutions and Colleges, with workers engaged in development activities in the field and with administrators and farmers, the Committee was struck by the prevailing low morale among the agricultural services and the frustration arising from the belief that agriculture hardly ever received the attention that it deserved; was treated in the past and is still being treated as a 'minor' department, only to be remembered in times of national emergency of food shortage, arising partly from the ever increasing population and partly from the failure of monsoon or uncharitable weather conditions. Little attention has been paid to building up stable departments of agriculture manned with adequate competence and with the requisite sense of urgency and singleness of purpose. Agriculture has never received its due share in the national intellect—mainly for the reason that conditions of service as compared to other services have not been attractive enough for the young men of the nation, who offer agriculture as positively their last choice. In the State Departments of Agriculture, a very large proportion of the posts—30%-80%—are of a temporary nature, promotions are few and far between, and are given largely on the basis of seniority and seldom on the basis of merit. Cases are not lacking of promising workers in research having to hang on from 10 to 20 years on posts entirely temporary, with hardly any prospects of old age pension and other benefits. Absence or near absence of selection grades and various other handicaps have lowered the stature of the agriculture services in the country. Many who are competent have to struggle against a cumbersome and outmoded administrative machinery which, not only makes it futile to strive to be competent but even encourages and promotes mediocrity, bestows on them responsibility without authority over either their budget or the individuals placed under them, wastes precious weeks and months in perfecting procedural niceties, relegates

the field and the scientific worker to the domain of paper, files and accounts, and denies technical leadership and recognition in the field of his specialisation. It is indeed, a sad commentary on administration that the recommendations made nearly thirty years back in the epoch making Report of the Royal Commission on Agriculture in India, received only nominal attention. Many other similar documents, produced subsequently, and the recommendations made therein met a similar fate. Administrative conveniences have not infrequently brushed aside technological necessities. As aptly pointed out in a recent review of food production programmes in a State, "the problem of increasing agricultural production in India is more an administrative problem than a technical one". By this it is meant that, "our agricultural scientist will not have to make any new discoveries or recommend any new measures before we can plan for additional food production. All that is necessary is to follow, on a larger scale the advice about the methods of cultivation which the various departments of agriculture have been recommending to the farmers over the last decade. The real problem is to make all the ryots, big and small, adopt these revised methods, and that is a problem for the administration".

1.9 The Committee is strongly of the opinion that a streamlined agricultural administration is an urgent necessity and the food situation of the country can be appreciably eased if positive steps are taken to achieve this objective. Administrative lapses have universally contributed towards shortfalls in implementation of Agricultural schemes and thereby directly caused shortfalls in production. The picture is indeed bleak enough to justify that drastic measures be taken, not merely to retrieve the situation but even more, to make up for time already lost. A change of heart, and of purposes and of leadership in the field of agriculture is of National importance. A bold attitude to see 'new wine in new bottles' has to be developed towards reforming Agricultural Administration in India. The problem has also been vigorously posed by Dr. Ensminger in the following words :

"The administration and staff of agricultural departments needs to be thoroughly reoriented, on a vigorous and broad scale, to give first priority to an impact action programme for higher food production. India has the know-how for food production. The crux of the problem now is one of gearing up its administration to get the food produced.

"As one looks at the administration of agricultural programmes, both in the Centre and the States one observes two disturbing things. First, there seems to be an almost total absence of any sense of urgency about increasing food production; there is even, one might say, what appears to be an actual acceptance of the traditional village farming methods which yield so little. The conviction that these ways must be changed, and that it is the crucial business of the agricultural departments to change them, does not

seem to have taken hold. The tendency appears strong to keep to the traditional emphasis on regulatory activities rather than active field development, or, to put it bluntly, to concentrate on paper rather than people.

"Second, these attitudes result largely from the fact that the administration of agricultural programmes, in its machinery and procedures, is simply not keyed to development. It is keyed to regulatory functions, again to paper rather than people. It has had little to no experience in mounting an impact programme involving all of India's villages in accomplishing a specified result.

"This is in no sense a condemnation or criticism of individuals—rather of a system, an administrative point of view which in pre-Independence days may have been acceptable but is wholly inadequate in the urgent, indeed emergency needs of the nation today.

"If India is going to mobilize itself for food production, the agricultural departments in both Centre and States must frankly face up to the fact that the whole administration in its objectives, its procedures, its rules, its staff assignments—needs re-orientation to an impact programme for increasing food production in the fields of each of over half a million villages.

"Specifically, the first step needed is that a realistic action programme must be drawn up which will bring to the village fields the knowledge, the farm supplies, the technical staff and advice necessary to help and encourage the village farmer to change his old unproductive ways.

"Secondly, staff must be assigned or re-assigned, and given responsibility with adequate authority for carrying out this programme.

"Thirdly, many old and once valued administrative procedures will have to be changed streamlined, if you will, to permit the programme to be carried out and the responsible staff to function, without being tied up in red tape. For example, I understand that to get a minor irrigation work underway requires the local officer to send it for approval twice—once for examination and inclusion of the project in the budget, the second time for review and approval of the budget itself. This cumbersome procedure obviously means delays inconsistent with the need for speedy action".

Acknowledgements.

1.10 The Committee would like to thank the State Governments for furnishing replies to the Questionnaire and for providing supplementary information, as and when required subsequently. One State did not reply to the Questionnaire issued and in the case of two other States, the reply was received after the finalisation of the draft report. The Committee is also indebted to the State Governments and to a very large number of State Officials at all levels, for arranging visits to various institutions and to places of interest and for extending their valuable help, assistance and hospitality in a generous

manner. The Committee would like to place on record its appreciation of the services rendered by Dr. R.N. Mathur, Member-Secretary of the Committee. Without his conscientious efforts, such a comprehensive study of the mass of information and material pertaining to the agricultural administration of States could not have been possible in such a short time. His labour and devotion made a significant contribution to the timely submission of this report. We are also grateful to Dr. W.S. Mann and Sarvashri T.R. Anand and B.D. Sharma who helped the Committee in the collection of material and analysing the data giving background information.

CHAPTER II

GROWTH OF AGRICULTURAL DEPARTMENTS AND THE PREVAILING SERVICE CONDITIONS

Growth of Agricultural Departments.

2.1 Agricultural Departments in most States were established between 1876 and 1905. Till the year 1920 these departments largely consisted of a few Deputy Directors of Agriculture, Agricultural Chemist, Economic Botanist, Entomologist, Mycologist, and some supporting staff. As the usefulness of plant breeding and genetics came to be recognised, posts of crop specialists or additional Economic Botanists were added to the Departments. During the thirties, under the inducements offered by liberal grants from the Indian Council of Agricultural Research and the Commodity Committees, a large number of research posts were created on a temporary basis; but the staffing of the education and extension branches remained unchanged. Staff was added as each individual new scheme was sanctioned with the financial assistance from the bodies referred to above, and some of these posts were made permanent later on. Owing to financial stringency in the States, it became difficult to secure any general expansion of the department, unless financial assistance was available from outside. This often led to starving of research on vital food crops like rice, millets and pulses, as the meagre State resources were allocated to research on sugarcane, cotton etc. Thus, conditions for planned growth and development of the Departments of Agriculture did not exist, though the research schemes of the I.C.A.R. and the Commodity Committees, apart from enlarging the field of research, rendered very valuable service by providing employment and opportunities for gaining useful experience to those who had specialised in agriculture and associated subjects.

2.2 It was only after 1944 that, under the stimulus provided by the Grow More Food Campaign, a real effort was made to strengthen the extension side of the Agricultural Departments. A substantial expansion in the field of agricultural education occurred during the First Five Year Plan, mainly arising from the demands made by the Community Development Programme.

Dependence upon Stimulus from the Centre.

2.3 Since the thirties the States, by and large, have been so used to being dependent upon the Central Government, the I.C.A.R. and the Commodity Committees for strengthening their departments of agriculture, that they find it very difficult to persuade their Governments to approve the schemes which have not been recommended by the Central Government or Central Committees. In the opinion of the Committee, this tendency of depending upon stimulus from the Centre for taking action on a subject which is the main responsibility of the State is not a healthy one.

Periodical review of needs by high power Committees.

2.4 The States should periodically undertake an examination of the structure, objectives and policies of the State Departments of Agriculture with a view to providing a balanced growth of the department and enunciating programmes and policies in consonance with the needs of the agriculture of the State. A Committee consisting of eminent agricultural administrators, scientists and progressive farmers can usefully undertake this examination, once in five years or so.

2.5 A similar Committee may be appointed at the Centre also, once in five years, to examine the programmes and policies of the Central Commodity Committees and other Central Institutions dealing with agriculture, with a view to promoting a balanced development of agricultural research, education and extension, and harmonizing the different, and at times conflicting, policies which impinge on land use, agriculture, animal husbandry and forestry. Since the appointment of the Royal Commission on Agriculture in India which submitted its report in 1928, there has been no comprehensive examination of the entire field of agriculture in its broad sense, though there have been a number of Committees which have examined different facets of agriculture at various times.

History of Agricultural Services and some recommendations of the Royal Commission on Agriculture.

2.6 Prior to 1920, only Bombay and erstwhile Central Provinces had a regular Provincial Agricultural Service, but as a result of the recommendations of the Public Services Commission, also known as the Islington Commission, such services were constituted in all the States after 1920, partly by absorption of special posts, partly by promotion from subordinate services and partly by direct recruitment. In all provinces the minimum pay of this service was Rs. 250/- p.m. and the maximum Rs. 750/- p.m. The strength of this

service in 1928 was 157. Below the Provincial Service, there were Subordinate Services with varying rates of pay, for which the qualification required was a degree or a diploma of an agricultural college. The scales of pay differed greatly, but the minimum starting pay of the upper grade was not less than Rs. 60/- and the maximum not more than Rs. 300/- per mensem. The lower grade of the service consisted mostly of those who held a certificate of passing the two years' course of an agriculture college, the minimum pay not being less than Rs. 30/- and maximum not more than Rs. 180/- per mensem. The lower grade of the subordinate service was eliminated in the thirties as by then all the Certificate courses had been converted into Degree courses.

2.7 In 1924 the recruitment to the Indian Agricultural Service ceased, because of the decision not to make further recruitment for all India Services in subjects which were transferred under the Constitutional Reforms of 1919, to the control of the Governors of Provinces acting with their Ministers. In 1924, the sanctioned strength of the service was 157; 138 being with the State Governments and 19 with the Government of India. By 1928, only 93 officers were performing the duties of these 138 posts in the States and Government of India. It was intended that a new superior Provincial Agricultural Service would be established to take the place of Indian Agricultural Service, but by 1930 the idea of constituting a common Superior Provincial Service was abandoned. A number of States, however, constituted a Class I Service as distinct from the Class II Service.

2.8 The Royal Commission on Agriculture in 1928 also made important recommendations with regard to the service conditions, but unfortunately most of these recommendations have not been implemented and many of our present problems of low morale and inefficiency would have been avoided if these recommendations had earned more sympathetic consideration.

2.9 The Royal Commission recommended that the scale of the Indian Agricultural Service should be sufficient for Class I appointments with special pay for research and administrative posts requiring exceptional qualifications. In a number of States, what was meant to be Class I Service was not at all established and what was meant to be Class II Service was required to carry out the duties to be performed by the higher service. The Commission had recommended that agricultural research in India required men who combined scientific knowledge and technical research of the first order, with a vision and creative power essential to the opening of an original line of work. The Commission further recommended that men capable of original research should be recruited to Class I Service and those

fitted to carry on the work along well established lines be appointed to Class II and the promotions from Class II to Class I were to be rare in the case of research posts. On the administrative side, it recommended that a considerable number of vacancies in Class I appointments be normally filled by promotion of Class II Officers. It was the considered opinion of the Commission that restrictions on recruitment of new superior Provincial Agricultural Service to a Province would tell quite seriously on its efficiency and the Commission was not in favour of short term agreements for engaging the agricultural workers. As against these recommendations, recruitment to Class I of the Service was practically restricted in all States to the residents of the State and promotions from Class II to the Class I were carried out on a liberal scale even in the case of research posts. In a majority of the States, the scales of pay of Class I posts were no longer attractive to men with first class talents. Furthermore, the opportunities for direct recruitment to research cadres were restricted by promotion of Class II Officers.

2.10 The Royal Commission had further recommended that promotion to Class II posts should be directly by selection on grounds of merit and that no weight should be attached to seniority. Unfortunately, in many cases merit was ignored and undue importance was attached to seniority, with the result that the quality of the service deteriorated.

2.11 The Royal Commission considered the posts of Director of Agriculture and the Principal of an Agricultural College of such importance that they scheduled them as selection posts, outside the cadre of Class I Officers. They suggested for the Principals of Agricultural Colleges a scale of pay of Rs. 1500-50-2000 and recommended that the Director of Agriculture should be placed on terms of equality with the Heads of other important Departments, such as those of the Public Instructions and Forests. It was recommended that the officers selected for the Directorship should combine administrative capacity with high scientific qualifications and if it happened that the postulated administrative capacity was not forthcoming in the Department of a particular Province, the local Government should, in the first instance, turn to the Agriculture Department of another Province and failing that to the Indian Civil Service. Unfortunately, these recommendations were also not implemented and an increasing number of Directorships went to officers of the administrative service.

Paucity of competent Officers.

2.12 Today, there are only a handful of senior competent officers available in the Departments of Agriculture and the gap between them and those who

can take over after them is a disconcertingly wide one. The country suffers from an acute shortage of experienced agricultural officers who possess vision, initiative and drive. Technological competence and administrative efficiency are not at the level to be expected and the morale of the Departments of Agriculture is generally low.

Observations made by the Indo-American Team.

2.13 The Joint Indo-American Team on Agricultural Research and Education in their Report (1955) have stated:-

"341. Some of the major difficulties in the way of developing improved technical leadership in the fields of agricultural research, education and related advisory services are due to current policies of administration and personnel management. Considerable attention has been given to the development of improved agricultural facilities, including colleges and research laboratories in recent years. There is some indication that the enthusiasm for developing improved physical facilities has been accompanied by a lack of adequate foresight in providing for the type of scientific and teaching staff that is essential if the new facilities are to function effectively.

"343. The problems relating to professional agriculturists and their administration in India are numerous and complex. They must be analysed carefully and definite steps taken to improve the position of agricultural scientists and educationists, if technology in agriculture in the country is to progress.

"344. The direction or supervision of research or educational programmes in agriculture, as in any other field, must be entrusted to individuals who have a full understanding of the problems, requirements and potentialities in these technical fields. The head of a research institution must be a stimulating, driving force capable of perceiving the nature of complex problems, determining the feasibility of the various research approaches, and must fully understand that research in many instances must be slow, laborious and, in numerous instances, unproductive. Such proper technical leadership will lend stability and provide for continuous progress in research. The same general qualities are required in the education and extension fields. There is a tendency in some States or institutions to place non-technical administrative officers in charge of agricultural research, education and other technical services. This is a move toward mediocrity in technology. It is recognised that individuals who have had the varied experience provided by the practice of shifting from one administrative post to another of continuously higher responsibility do acquire a broad background experience that is valuable in enabling them to meet many diverse and complex administrative problems. They become extremely competent in making decisions on broad administrative matters. Progress in the technical fields of agriculture, however, requires more than ability to iron out administrative wrinkles. It requires the leader-

ship of career professional agriculturists rather than career professional general administrators.

"345. The Team had the occasion to contact a number of State Directors of Agriculture who were non-technical men. There was no question about the general competence or ability of these individuals. It was evident, however, that in many instances their knowledge of the deep-seated problems of agriculture was largely superficial and they could not provide the leadership or understanding necessary for the handling of the important technical matters in agriculture. Considerable time of their subordinate technical workers was occupied in educating the non-technical administrative superiors, who then made the final important decisions. An equally important detrimental factor is the potential long term effect on scientists whose efforts and ambitions will be shackled by such non-respected, non-technical leadership.

"346. Science and education are the creative and productive forces for India's agriculture. They must be provided with the highest calibre of technical guidance available in the country. This relates to the key positions of supervision not only in the research and educational institutions, but also in the positions of State Directors of Agriculture, since these positions have immediate responsibilities for research and education in agriculture at the State level".

2.14 The Prime Minister has also remarked :

"In order to get the best results, the top positions in the Agriculture Ministry and the Agriculture Department in the States should be manned by technical men with practical experience of agricultural problems and these men should be allowed freely to operate on their budget allotments...."

Dead wood in the Departments.

2.15 The Committee has been informed in the States that if the required quality of personnel were available and if it was possible further, to replace the existing personnel, the Directors of Agriculture would like to replace about 30% to 40% of the existing agricultural staff. The money which may have been well spent in attracting better staff is now being utilised in perpetuating inefficiency. Willingness to recognise the Agriculture Department as a major and important department appears to be still lacking, though thirty years have elapsed since the Royal Commission on Agriculture submitted its report and eleven years have passed after achieving Independence. The priority that is attached to agriculture in our pronouncements on the National Plan has yet to be reflected in a concerted effort to improve the conditions of agricultural services. It is, therefore, important that suitable steps are taken to remedy the situation in good time.

Need for Better Service Conditions.

2.16 Technical departments like the Departments of Agriculture, Animal Husbandry etc. have not been developed to the same extent in the past as general administrative services. The index of development in the country, in this scientific age, specially in a welfare State, is determined by the status and efficiency of the technical staff and their number. If this barometer of progress is accepted, as it has to be, then it does not speak well of the progress made in agriculture, which constitutes the most important sector in our economy.

2.17 It is often said that technical services have not been able to deliver the goods. May be this is partially true. The fault is not so much of the technical services, but the conditions in which they work. The causes of this malady are much more deep rooted than would appear on the surface by a casual or superficial examination of the problem. Agricultural services have suffered from a number of chronic disabilities, which have inhibited their growth and development. The right type of environment for full blossoming of their initiative and constructive abilities has been lacking.

2.18 The obvious shortcomings and handicaps from which the agricultural services suffer are many and the Committee would like to draw attention to a few of these handicaps.

Large number of Temporary posts.

2.19 A very large number of temporary posts still exist in the States for long periods, despite the desire of Governments that all temporary posts continuing for more than three years and having a reasonable chance of continuing, should be made permanent. In some States posts sanctioned after 1932 have not yet been added to the cadres of the services, with the result that from 30% to 80% of the posts are still temporary in State Departments (Appendix IV). The pensionary rights of agricultural workers are adversely affected by the temporary nature of posts in the State Departments and in I.C.A.R. and Commodity Committee Schemes. There are many cases where first rate research workers have suffered severe hardships on this account. In one State, the Committee was informed that incumbents of temporary posts were not even entitled to the annual increment in the time scale.

Low scales of pay do not attract talent.

2.20 The principal among the handicaps with which the agricultural servi-

ees are suffering from is the low scales of pay. It is a well known fact, that the scales of pay of the agricultural services are much less as compared to those of the general administrative services, and even of other technical services, such as Engineering, Medical, Education etc. Since the last World War especially, students who fail to secure admission to the Medical, Engineering or Science Colleges, as a last resort, turn to Agricultural Colleges. Among the students admitted to the Agricultural Colleges there may be a few who have passed in higher Divisions, the remainder are generally third divisioners. It is obvious, therefore, that strong agricultural departments cannot be built up with third class human material. Agricultural workers all over the country feel that only lip sympathy is being paid to agriculture, which has not received sufficient importance. The Committee is of the opinion that there is a strong need for planning and distribution of national intellect and talent.

2.21 If the importance, which is due to the technical services, has to be given to them and the principle of parity between the technical services and the administrative services, as has been voiced by our leaders, is to be accepted, then it is essential that the technical services be paid at rates at par with administrative services. Unless this is done, the best of the talent available in the country, by and large, will be attracted to administrative services as at present, and starve the technical services of talent which is so essential for their healthy development. To quote the Joint Indo-American Team on Agricultural Research and Education,

“373. The disparity between salaries of scientists or teachers in agriculture and administrative positions is unrealistic and results in a down-grading of scientific stature in India. Research and education are creative forces that provide new wealth for the country, both through the development of material goods and the enrichment of an enlightened population. The ablest minds trained in India's Colleges and Universities should be channelled into this highly productive technical research and education activity. This does not happen in the present circumstances, wherein the greatest opportunities for personal welfare lie in the acquisition of a position in the Government Administrative Services. A disproportionate share of India's intellectual competence is thus decanted off into the administrative field. While such services are important, it is unfortunate that the difference in salary and financial opportunity is such that many of those who might be more interested in following a scientific or technical professional career are lost to this field”.

2.22 In a State, the grade for Agriculture Inspectors which constitutes the department's main striking force at the field level has remained the same for the last 40 years. In another State, the minimum pay of an agriculture graduate employed as Demonstrator is the lowest (Rs. 100-5-140-10-220) as

compared to a Khadi Instructor (Rs. 120-5-175), with a Senior School Leaving Certificate or Junior Engineer (Rs. 150-10-250) with a Bachelor's Degree in Engineering or a Veterinary Assistant Surgeon (Rs. 150-5-200-10-300) with a degree in Veterinary Science. The Heads of Sections and Professors in a State Department of Agriculture are placed in the pay scale of Rs. 350-40-750-50-900-50-1250, while Professors of Medical and Engineering Colleges are placed in the scale of Rs. 800-1500 and Executive Engineers and Civil Surgeons in the scale of Rs. 625-40-1025/50-1275 and Rs. 600-40-800-50-900 (with permission for private practice) respectively. In another State, while an engineering graduate gets a starting salary of Rs. 225/- p.m., the agricultural graduate is given only a meagre pay of Rs. 100/- p.m. Even an M.Sc. in Agricultural subjects is given a starting salary of Rs. 100/- p.m. Good material among agricultural graduates is, therefore, not attracted to the State Department and finds good avenues of employment in private enterprises. A comparison of the pay scales prevailing in the Departments of Agriculture and other Departments in some selected States is given in Appendices V to VII.

2.23 The expectation that only technical services should work in a missionary spirit, while others enjoy all the advantages of status and position, that go with higher income, is rather far-fetched.

2.24 The Committee recommends that the scales of pay of gazetted, as well as subordinate agricultural services should not be lower than those for other services, requiring comparable training periods, particularly, because the agricultural services do not enjoy the same social prestige, advantages and facilities that are available to other services. For deciding the scales of pay, the length of training required after matriculation should not be the only criterion, as subsequent prospects for promotion and prosperity in the service are also important considerations. In Agriculture it is not uncommon for an officer not to secure a promotion till he has completed 20 years service in the subordinate grade and then retire, reaching a maximum of only Rs. 400 to 500 p.m. in the gazetted service. In an important State, a majority of officers in Class I service in the scale of Rs. 350-1150, retire at a pay of Rs. 500/- to Rs. 600/- p.m. without ever reaching anywhere near the maximum of the time scale.

2.25 For raising the morale and for bringing about an improvement in the quality of the agricultural extension staff, it is necessary to upgrade the posts of District Agricultural Officers and Regional Deputy Directors of Agriculture. The District Agricultural Officer who is to play the role of an Adviser to the District Officer should be paid as well as other members of the District team. The minimum pay of the post of District Agricultural

Officer should not be less than Rs. 350/- and that of a Deputy Director of Agriculture not less than Rs. 600/- per mensem.

Slow promotions and lack of opportunities for promotions.

2.26 The chances of promotion to higher posts or higher scales of pay are also much less. Cases are not uncommon where even after 20-25 years of meritorious service, good workers are unable to secure promotion in the department. In some States promotion is based on a negative selection and as long as there is nothing against an officer in his personal record, he is given promotion according to his seniority. In another State, research and teaching posts are filled up only by direct recruitment and senior workers who exceed the age of 50 years are precluded from promotion. While all the I.A.S. officers will get the senior scale of pay going upto Rs. 1800/-, and 33% of the P.C.S. officers are likely to get this scale, in the agriculture services only one out of 100, or even less, may get near about this scale; and that too after putting in two to three times as much service as put in by the officer belonging to the general administrative services.

2.27 There are no selection grades in technical services, except perhaps in some States, and there too, the grades are unattractive and the percentage entitled to the grade is extremely small. Delayed promotions among agricultural personnel, when their colleagues in administrative services or even in commercial organisations get rapid promotions are disheartening and lead to frustration. It is a paradox that services concerned with developing the agricultural economy of the country and food production, so essential for the success of our Plans, should be paid the worst and have the least chances of promotion.

Promotion by seniority alone would not do.

2.28 The Indo-American Team in their Report have observed :-

“355. Another major problem in the advancement of scientists is the transfer of specialists trained in a certain discipline to high level positions in another scientific field for which they are not especially qualified, but to which they are considered entitled on the basis of seniority. The Team was advised of an individual trained in palaeontology who took a position as a teacher of plant pathology, immediately following his advanced training, since this was the only post available at that time. After more than ten years in this post he obtained a position as a research specialist on sugarcane. Although he had no previous research experience, and no significant knowledge of sugarcane breeding and production practices, he was appointed to this position because of his seniority rights to the post. After several years in this position he was transferred to

a post as an 'expert' in the breeding and improvement of cotton, wheat, barley and paddy. Eventually paddy was eliminated and he is currently an expert on wheat, barley and potato breeding. It was stated that this individual would have preferred continuing in the teaching profession but had no opportunity to advance financially to a reasonable level without transferring to another field of work.

'356. In a second instance, a scientist has been working for more than ten years on the breeding and improvement of oilseeds and pulses. His experience includes work with 26 different crops, all requiring specialised knowledge of their genetics and breeding behaviour in the improvement research programme. The head of this research section has recently taken another post. Instead of advancing the well qualified existing staff member, the Team was advised that another man from outside of the section was being brought in 'because he was senior individual'. The net result will be that India will lose the competence and background of experience that has been developed through the many years of efforts of the scientist working in oilseeds and pulses since that man will eventually seek a position outside of his section to which his seniority will, in turn, entitle him".

2.29 The Committee is in agreement with the views expressed by the Indo-American Team. Public interest or the interest of the subject matter should be safeguarded by the retention of the good research workers and their promotion in the appropriate subject matter. In one State, a great majority of the staff did not have the requisite technical competence and initiative or even earnestness to acquire competence. Men with competence and drive get things done inspite of normal difficulties that exist in any administration. Ability to show progress inspite of normal administrative difficulties was noticed in a few instances, while, in a majority of cases, this was lacking. If these virtues are to be promoted, there should be adequate recognition of merit at all stages, and those who have not shown initiative and progress should be made to realise that their advancement would not merely depend upon seniority.

Supernumerary posts.

2.30 Some system has to be devised whereby, the staff which has the requisite aptitude and has acquired competence in a special subject, is continued in the same line without allowing their prospects of promotion to suffer. To achieve this, the Committee would suggest the creation of a few supernumerary posts in each superior cadre. If an individual whose services are considered indispensable gets promotion in another line, it should be possible to retain him, on promotion, against one of the supernumerary posts, till such time as a suitable vacancy occurs in the normal manner.

When such a vacancy occurs, he would get the normal promotion and the supernumerary post could be released to the pool.

Opportunity for leadership.

2.31 The chances of leadership in agricultural services in our country are limited, if not non-existent. It is human nature to aspire to assume leadership and come to the top. This is as it should be, if we are to continue to progress. However, this is the destiny of only a few; but in a welfare and democratic State, the opportunities of becoming leaders should be equal for all. In our administrative set up, which now forms the base and skein of welfare administration in the country, the dice is loaded against the technical services. The mantle of leadership right from block, tehsil, district to the State level, in the present context of things, will invariably be donned by the members of administrative services. There are hardly any opportunities for technical services to work and aspire for this leadership, except when it may please Providence to choose a solitary individual here and there. It will be a negation of social justice to confine leadership in the field of agricultural development to any one class or group of individuals.

2.32 The impact of poor prospects in agricultural services exerts an adverse influence in many ways. Quite often, technical men find that officers from administrative services who have worked in a position subordinate to them, very soon find themselves in positions of authority in the higher rungs of the administrative machinery, while they remain static on account of slow promotions and an absolute bar to their working in administrative posts in the field or the Secretariat. This creates a psychological background which is not conducive to their contributing their best in the service of the country. Is it then any wonder that the technical services have developed certain complexes due to the environment in which they have been nurtured ?

2.33 Enough has been said to indicate the urgent need for revising the pay scales and the terms of service of technical services in the Centre, as well as in the States. This is more important in the States which have a direct responsibility for developing agriculture in this country.

Formation of an All-India Agricultural Service.

2.34 Nothing short of forming an All-India Agricultural Service, with scales of pay and prospects at par with the I.A.S. would, in the opinion of this Committee, raise the morale and efficiency of agricultural services and thereby, attract equally suitable material for manning the services, and bring about uniformity of standard. The formation of such a service will also

facilitate exchange of officers from one State to another and from the States to the Government of India. Such exchanges will not only help to produce officers of All-India experience and competence, whose number has dwindled fast, but also enable the governments to attract and hold in the agricultural services some of the ablest minds trained in India's Colleges and Universities. An All-India Agricultural Service had in the past served the country well and had helped to produce some of the top agricultural and animal husbandry specialists.

2.35 Financial stringency should not be made the basic consideration for deciding against the formation of an Indian Agricultural Service, considering that it did not stand in the way of the expansion of administrative services after the war, and more so after Independence, in spite of the fact that they were numerically much superior than the Agricultural Service.

2.36 Till such time as an All-India Service can be created an 'Agricultural' or 'Technical' cadre or pool may be created in the I.A.S. to which 33% of technical officers, corresponding to status of State class II service (i.e. corresponding to Provincial Civil Service) and above may be recruited by the Union Public Service Commission strictly on merit and competence. This will stimulate the agricultural services to give their best contribution to the development of agriculture and enable them to work in an atmosphere of freedom and equality. To meet other situations arising from the large nation-building activities, Industrial Pools and other All-India Services are being formed and the formation of an All-India cadre in the agricultural sector, in a country where agriculture is the premier industry, should brook no delay.

Revision of Service Rules.

2.37 Service rules have not been revised in some States for the last 25 years. In one State no recruitment rules exist for any post barring a few senior posts for which rules were framed in 1931. Nor is there any system of framing qualifications and method of recruitment whenever a post is created. Certain draft rules are reported to have been prepared and are under consideration, but even these rules do not seem to provide a quota reserved for departmental candidates and direct recruits. Since 1954 these rules are pending with the Appointments Department of the State. As posts are filled mostly by promotion, on the basis of seniority, there is no recognition of merit, and there is no scope for the development of initiative, keenness or enterprise, because each man feels that his promotion will take place only by turn. The non-existence of recruitment rules and qualifications prescribed in advance, together with absence of published gradation list,

can lead to ad-hoc adjustment of recruitment procedures to suit a particular situation, which demoralises the service. It is understood that a number of posts have been made permanent recently and the problem of confirmation will become a serious one in the absence of service rules and up-to-date gradation list, which is recognised by the members of the service.

2.38 The procedures mentioned below cause discontent and dissatisfaction in the services and can be got over by framing proper rules for recruitment, confirmation and promotion within the agricultural services. For this purpose, it is recommended that an experienced administrative officer from the Appointments Department be placed on deputation with the Secretary, Agriculture, for drafting or revising rules of agricultural services, after taking into consideration the recommendations of this Committee:

- (a) Prescribing different qualifications for the same post on different occasions.
- (b) Alterations in the channels of promotions from one special subject to another, or from one branch to another, for example from research to extension or vice-versa.
- (c) Frequent changes in seniority.
- (d) Ambiguity regarding the examination to be passed, and the conditions to be satisfied before confirmation, promotion or crossing of the efficiency bar.
- (e) Inadequacy of selection-grade posts involving a higher start in the scale; for example persons appointed to the posts of Heads of Sections, Deputy Directors etc. may start at a higher level as in the case of Superintendent of Police or a Superintending Engineer.
- (f) Absence of supernumerary posts which can be given to outstanding research workers for enabling them to stick to their particular problem or line of research.
- (g) Absence of an adequate reserve in each cadre for meeting the leave, training and deputation requirements. On the basis of past experience it should be possible for the Departments of Agriculture to determine the average number of posts required for deputing officers to work on I.C.A.R. and Committee Schemes. The staff requirements based on Community Development pattern should also be added to the appropriate cadres.
- (h) Absence of procedures and qualifications for selecting departmental candidates for postgraduate and foreign training; panels

selected by Departmental Committees should be available at all times.

- (i) Absence of procedures for periodical assessment of officers work.
- (j) Absence of procedures for the selection of non-gazetted candidates for promotion by Departmental Committees which inspire confidence.
- (k) Absence of proper balance between selection grade posts and posts in other superior and lower cadres.

Aptitude.

2.39 It is obvious that only those who have an aptitude for agriculture should be recruited in the Agricultural Department and since most of the Agricultural graduates are absorbed in the Agricultural Departments, it is necessary to ensure that only those students who have real aptitude for agriculture are admitted to the Agricultural Colleges. We are aware that for admissions in certain Agricultural Colleges, preference is given to those who own lands or come from farming families, but both of these conditions are capable of so wide an application that they become in reality, ineffective. It is quite conceivable that a man who owns land may not also have an aptitude for agriculture. Evolution of suitable tests in aptitude and their adoption prior to admission to the Agricultural Colleges is urgently called for.

2.40 In research institutions particularly, it is essential to develop suitable cadre of staff which has an aptitude for research in the field of a particular subject matter.

Qualifications.

2.41 Posts in the Agricultural Departments are largely filled by recruiting agricultural graduates, though in research and teaching branches some post-graduates having training either in chemistry, botany or zoology are recruited. In our opinion it is desirable that research and teaching posts are filled up by most competent persons, as ultimately, on the quality of work produced by these persons will depend the prosperity of the country to a large extent. For the Extension and Farm Management branches of the Department of Agriculture, an agricultural graduate is very necessary and a science graduate will be a poor substitute. In these two branches local experience would be of considerable value and, therefore, for the post of Agricultural Extension Officers at the Block level, Agricultural Officers at

the Tehsil, Sub-Divisional and District levels, we recommend that no higher degree need be prescribed than a degree in agriculture. In one State, the appointment of Extension Officers at the Block level has been thrown open to science graduates also. Appointment of science graduates would mean that the limited number of Extension Officers' posts available for agriculture graduates would for a long time be occupied by persons who would not be competent to deal with field work in agriculture. Such misfits would not normally be replaced for the next 25 to 30 years. We would suggest that in future recruitments, steps should be taken to rectify such mistakes.

Promotion Quotas.

2.42 Out of the posts which involve promotion in these two branches i.e. Extension and Farm Management, 60% of the posts may be filled up by promotion and 40% may be thrown open for direct recruitment. For direct recruitment to these posts, younger candidates need to be recruited and, therefore, suitable age limits should be insisted upon. Undue emphasis should not be laid on experience as it is difficult to compare a bright student who has passed out of the college with a subordinate, who has put in 20 years of service and acquired experience. The intention is to recruit a certain number of bright youngmen in the services before they have lost their initiative and drive by serving long periods in subordinate positions. Unless this is done, first class students would not be attracted to the agricultural colleges and the quality of the Agricultural Services in the gazetted ranks will not improve. The introduction of fresh blood in different grades would also tone up the service and thus help in administration. Of the posts of Deputy Director of Agriculture 50% may be filled by promotion and the remaining 50% by direct recruitment, provided the candidates who apply have a Master's Degree in Agriculture. This arrangement may be reviewed when the posts of District Agricultural Officers are upgraded to Class I, with a view to see whether a certain lower percentage may be reserved for direct recruitment with appropriate age limits, to enable bright young departmental candidates to compete.

Grouping of posts.

2.43 In the States which have a Professor in Agronomy, Agriculture or an Agronomist as a Head of a Research Section or a Professor of Agricultural Extension, these posts may be classed along with the posts in the Extension and Farm Management Branch of the department of agriculture, with a special educational experience attached to these posts as required by the University. A grouping of these officers, together with other extension

personnel will provide opportunities for rotation of staff and avenues for promotion. The rest of the research and teaching staff may be broken up into certain categories amidst which there would ordinarily be no interchangeability at the choice of the member of the service, except in the interest of public service.

2.44 Other groups as shown below are merely illustrative :—

(1) *Botany Group.*

- (a) Crop Botanists.
- (b) Professor of Botany.
- (c) Physiologist.
- (d) Cytogeneticist.
- (e) Horticulturist—in States where the Horticultural Branch is not well developed. Where this is well developed with a large personnel, it might be advantageous to have a separate category for Horticulture.

(2) *Chemistry Group.*

- (a) Professor of Agricultural Chemistry.
- (b) Agricultural Chemist.
- (c) Soil Physicist.
- (d) Micro-biologist.
- (e) Soil Survey Officers.
- (f) Manure and Compost Officers, etc.

This is very bad
Soil Science must
be a full branch if
it amounts to any
thing

(3) *Zoology Group.*

- (a) Professor of Entomology.
- (b) Entomologist.
- (c) Plant Protection Officer.

This category may also be included under the Mycology Group.

(4) *Mycology Group.*

- (a) Professor of Mycology.
- (b) Mycologist.
- (c) Virologist.
- (d) Plant Pathologist.

Where the number of posts in the Zoology and Mycology groups is very small, these two categories may be treated as one.

(5) *Agricultural Economics and Marketing.*

- (a) Marketing Officers.

- (b) Agricultural Economist.
 - (c) Professor of Agricultural Economics.
- (6) *Statistics.*
- (a) Statistician.
 - (b) Professor of Statistics.

Where the number of officers under this group is small, this may be merged with the previous group.

- (7) *Agricultural Engineering.*
- (a) Agricultural Engineers.
 - (b) Mechanical Engineers (including Tractors)
 - (c) Minor Irrigation Engineers.
 - (d) Professor of Agricultural Engineering.

Qualifications for direct recruitment.

2.45 (1) The qualifications for direct recruitment in Botany, Zoology, Mycology and Chemistry groups may be as follows :—

(i) Junior Research Assistants: Bachelor's degree in Agriculture or Science in the concerned subject.

(ii) Senior Research Assistants: Master's Degree in Agriculture or concerned Science subject.

A reservation of at least 20% for Science Graduates in the direct recruitment quota is recommended.

(iii) Gazetted Officers: Masters of Science in Agriculture or Science in the concerned subject.

(2) In Agricultural Engineering since the required personnel with post-graduate degree is not available, bachelor's degree, Civil, Mechanical or Agricultural Engineering should be the minimum qualification at all stages for direct recruitment.

(3) For Agricultural Economics and Marketing, it will be useful to recruit at least 20% by direct recruitment from amongst those who have had a good degree in Economics; for the remaining posts it is desirable to have agricultural graduates.

(4) In Research and Teaching Branches, including Statistics, 50% of posts of Senior Assistants and Class II Gazetted Officers may be filled up

by direct recruitment, and 50% by promotion on the basis of merit. It is desirable to fill up the Class I posts altogether by direct recruitment. It is suggested that in Research and Teaching Branches, Departmental candidates should be allowed, irrespective of their age, to apply for the posts which have been advertised for direct recruitment. During the selection, however, undue emphasis should not be laid on the length of experience since the quality of the mind is much more important for a research worker.

(5) The posts of the Principal of the Agriculture Colleges, and the Joint Directors of Agriculture, Research, Education and Extension should be treated as selection posts and should not be filled merely on the basis of seniority. In filling these posts as well as those of the Heads of Sections and Deputy Directors of Agriculture, the need for recruiting officers with merit, initiative and drive, who could ultimately occupy the top positions in the Department, should be in the forefront, as otherwise suitable officers will not be forthcoming in the Department for manning these responsible positions.

Subordinate Agricultural Services.

2.46 The suggestions made by the Committee in the foregoing paragraphs for improving the conditions of gazetted services in the States apply in equal measure to the Subordinate Agricultural Services also.

*If India get any what ever it
feel problem the soil work must be
strong. The "Agricultural Chemist" have
already failed. They lack good
training and understanding.*

CHAPTER III

TRAINING AND ASSESSMENT

Orientation and on the job training.

3.1 In the past, the officers of the Agricultural Department considered the training of their deputies and subordinates as an important duty. There was a realisation that they would themselves be judged from the work of their subordinates. This fast disappearing concept needs to be restored.

3.2 Where fresh agricultural graduates are recruited for filling the posts they have to be given orientation as well as 'on the job' training. The orientation training for a research worker or for a teacher should deal with such aspects as the importance of particular fields of study, the latest developments therein, and the critical analysis of the achievements in the field. In case of an extension worker even when he has had training in extension, an orientation course is necessary for providing him with background information dealing with the needs and problems of the particular area and the progress made in solving them. Even old staff when transferred, for the first time, from one agro-climatic region to another should benefit considerably from such courses. Such courses may vary in duration from two to three weeks and could be conducted, if so warranted, in the off season, at the Agricultural Colleges, Regional Stations, Government Farms, Extension Training Centres and the headquarters of the Deputy Directors. It is essential that this training should be given by senior, experienced and competent officers as successful techniques and methods have to be communicated to the junior colleagues during the course. The job-training should be designed to provide a working knowledge of the different jobs which the trainees will be required to control or be familiar with. This training has to be necessarily, of a practical nature as an under-study in the job concerned, for a period which is considered adequate for the purpose. Such training may involve both indoor and outdoor works of different types. For on-the-job training we would suggest that the Departments of Agriculture should work out charts indicating the nature of the job, the kind of training and its duration.

3.3 A systematic programme of training should be prepared in such a manner that ordinarily before the officer is called upon to fill a higher post he receives an orientation and 'on the job' training to equip him fully for the new

task. All second line officers who are likely to fill up first line posts should receive training. If arrears are allowed to accumulate in this respect it would become difficult to impart necessary training, as withdrawal of a large number of officers at the same time is not considered either feasible or desirable. Training should, therefore, be a normal affair and the needs of the training should be reviewed once a year at a convenient time such as the last fortnight of December. This review should relate to the officers who are likely to retire during the following 18 months, and the posts that are likely to fall vacant because of promotions and sanction of new posts. It would be appropriate if a study of this kind is made for research, teaching and extension branches of the Department. The Heads of the Sections may prepare similar reviews in respect of their Sections.

Refresher Courses.

3.4 The rapid strides that are being taken in the field of agricultural research, make it necessary for the agricultural officers to keep abreast of the latest developments. With the changing sense of values, the old fashioned habits of regular and systematic personal studies are falling into disuse. So much research work is being published even in a special subject that it becomes difficult for a specialist to keep pace with the developments in his field. Moreover, a specialist should also keep in touch with the cognate subjects.

3.5 The agricultural departments should make permanent arrangements for training and keeping their officers upto date. These arrangements should be systematic and operate in an automatic manner. The contents of these refresher courses should be carefully planned and there should be opportunities for discussion at the end of each talk given by a research specialist or a senior administrative officer. The course may be of a fortnight's duration and organised at Agricultural Colleges and Research institutes.

3.6 One State has completed a round of such refresher training for its entire extension staff (gazetted as well as non-gazetted, lecturers and instructors), and proposes to take another round after three years. An appropriate entry was made in the service record of those officers who passed with distinction or failed in the refresher courses. The Committee is of the opinion that those who fail in these examinations should stand to lose but, on the other hand, those who pass such examinations should stand to gain in matter of promotions.

3.7 The same State sends every year about 24 officers for M.Sc. at its Agricultural College and about 12 officers for postgraduate training at the

Indian Agricultural Research Institute, New Delhi. In addition, the State proposes to send 31 officers for postgraduate training abroad. Unless a well planned programme for advance training is organised, the impact of latest advances on our teaching and research will not be felt.

Intensive Courses.

3.8 In addition to the post-graduate training facilities mentioned above, it is necessary to organise at the post-graduate colleges, short intensive courses of four to six weeks duration, which can be taken up during the summer vacations by the members of the teaching, research or extension staff. These courses should cater to the needs of individuals and between four to five post-graduate colleges all the subjects should be covered. The information regarding these courses may be circulated at least six months in advance to enable officers to obtain necessary leave of absence which should be granted freely. A note should be made of such training in the officers' record, and due credit and weightage given to the examinations passed after the training, at the time of promotion.

Special Training Programmes.

3.9 In a developing economy new programmes are launched from time to time and to meet the situation, special training programmes have to be organised. For example, in the same State there is a programme to train 50 non-gazetted extension officers every year in soil conservation. In another State, a proposal is under examination for establishing an Agricultural Training College for Training Agricultural teachers for the Secondary Schools.

Regular Supply of current literature.

3.10 While the staff employed at Departmental research and educational institutions are well supplied with current journals, periodicals and other scientific literature, similar facilities for training the mind need to be strengthened at smaller farms and institutions which are often located at out of the way places. In order to keep the staff employed at these places fully abreast of modern developments and advancement in agriculture subjects, journals, periodicals, abstracts, reviews etc. connected with the subject should be supplied to them regularly. It is the duty of Government to keep the staff fully educated so as to improve their knowledge of current affairs. The extent to which modern knowledge is imbibed and assimilated should be checked up through a system of examination held at the end of the refresher courses.

Training in Farm Management.

3.11 Special training facilities need to be organised for imparting training in Farm Management operations. It is only through will managed

farms, running at a profit that modern agricultural practices can be demonstrated to the cultivators in a convincing manner. In view of the paucity of personnel with adequate practical experience it may be necessary for each State to select three or four typical farms and place these farms under the control of a competent farm manager, who should be provided with a Deputy. Farm Management training course should be organised on these farms, for the benefit of new entrants to the Extension Branch of the Department. In our opinion, this training needs to be organised urgently as nearly 4,000 Seed Multiplication Farms are being established in the country and though special training facilities are now becoming available for research and extension personnel, similar facilities are not available to those who are called upon to manage farms. It is, therefore, recommended that the State Departments of Agriculture should organise training courses in Farm Management and Farm Planning at three or four selected farms, where officers of the State Governments could be given advance training. Besides these selected farms, farm management courses could be organised at other Institutions such as Agricultural Colleges, Agricultural Schools, etc.

Need for advance planning of training programmes in foreign countries.

3.12 In this context the Committee would also like to emphasize that the need for foreign training should be assessed on a long-term basis for each State and panels of suitable candidates for different subjects be kept ready. The States and Central Governments should nominate for foreign training only those candidates whose names are on the approved panels, prepared in advance. These panels should be kept handy with the Central Ministry of Agriculture, so that full use can be made of the educational assistance offered by foreign countries. With the long experience gained in this work, ad-hoc selections and training programmes need be avoided. Officers after receiving training abroad should be posted back to the subject of their specialisation, so that the fullest advantage is obtained from the training given. It has been observed that in the past, sufficient attention has not been given to this aspect.

Training Reserve.

3.13 In view of the growing pressure of work, the State Agricultural Departments find it somewhat difficult to spare the personnel required for training. On the other hand, in the absence of training, the work often slows down and the pressure is further intensified. It is, therefore, recommended that in all the cadres of the Agriculture Departments, where there

are more than 8 to 10 posts in a particular subject, a training and deputation reserve should be created in addition to the normal leave reserve. The need for training is felt more keenly in the case of extension personnel because of the prevailing weakness, absence of specialisation and lack of facilities for self-education. In the past better quality of material has been attracted to research and teaching courses and because of this it is necessary to concentrate first on the training of extension or the field staff of the Department of Agriculture.

System of Examinations necessary.

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3.14 The Committee is of the view that periodical courses and examinations should be prescribed and the officers who fail to pass these examinations should not be confirmed, promoted or permitted to cross the efficiency bars. Emphasis should be placed, as mentioned earlier, on the passing of the prescribed examinations and individuals who fail to pass should be made to lose. This is considered necessary especially in view of the prevailing tendency to attach little importance to these courses and to treat them more as a holiday at the cost of Government.

Technical Supervision.

3.15 Agricultural Departments are often handicapped due to too great a dependence on seniority for promotion arising from very limited direct recruitment of young and promising men of initiative to the gazetted services in the department. Special steps have, therefore, to be taken to recognize and reward competence, initiative and keenness. It is often complained that though the cadres of the agricultural services have expanded considerably there is no proportionate increase in the out-turn. This criticism applies equally to research, teaching and extension branches. For recognising competence, initiative and keenness, it is necessary that there should be adequate and thorough technical supervision, at different levels, so that the right officers are located, trained and their work appreciated properly.

Assessment by Boards

3.16 Except for the confidential character-rolls and assessments made when the officers are confirmed or permitted to cross the efficiency bar, there is little evaluation of the work of officers. Thorough inspections which are necessary to judge the work of an officer have almost disappeared. Numerically, officers have increased so considerably that supervising officers are sometimes not in a position to study their juniors. Adverse confidential reports are often viewed as charge-sheets to be contested and

attempts are made to intimidate and question the bonafides of supervising officers. In these circumstances, certain categories of officers of the Agricultural Department should have an opportunity of being assessed at least once in three years by a competent Board, which may include the concerned and other independent Heads of Sections. In case of gazetted officers, it might be useful for the State Government to arrange for an independent assessment by Boards of agricultural scientists and technical men of repute from different parts of India. As a result of this assessment, it may be necessary to provide a change of place for certain officers who might be expected to do better in a different line. It should be seen that these reports deal with the quality and quantity of outturn rather than the personality of the individual judged. These reports will also enable the Director of Agriculture to assess the work of his departmental officers,

CHAPTER IV

COORDINATION

Coordination at various levels.

4.1 In a majority of States, coordination at the top level is secured through State Development Committees, consisting of the Chief Minister and other Ministers concerned with development. In some States, special Working Groups or Sub-committees for Irrigation and Agriculture have been formed for examining matters relating to utilisation of water for crop production. At the Secretariat level, there is another Coordination Committee, consisting of the Development Commissioner and the concerned Secretaries and Heads of Departments for coordinating the activities of the various departments in the Blocks. At the Divisional level coordination is provided by the Commissioners, who in some States act as Regional Development Commissioners for the purpose of Community Development and National Extension Service programmes. At the district level, there are Coordination Committees, presided over by the District Officers, with the District Agricultural Officer, the Block Development Officer and the Project Executive Officer as members. As far as the Block is concerned, the Block Development Officer functions as the agent of each department, including the Agriculture Department. The Agricultural Extension Supervisor is under the operational control of the Block Development Officer, but the administrative and technical supervision is provided by the Agriculture Department at various levels.

Coordination to be dynamic and purposeful.

4.2 Coordination of work whether in the multifarious Committees or in the field, is a knotty problem. What is more urgently required is a coordination of mind and action. A tendency has been noticed that some of the coordinating bodies function in a routine manner and there is little evidence of systematic follow-up action. Evidence is also not lacking to show that these coordinating bodies do not meet often enough. Furthermore, coordination cannot operate successfully unless adequate authority is vested in the coordinating body at all levels. To ensure this end, the Food Production and Development Commissioner in one State also func-

tions as the Principal Secretary to Government and occupies a position which is midway between the Secretary of a Department and the Minister-in-charge. He not only coordinates the activities of the various Departments concerned, so as to open up bottlenecks, but also ensures orderly execution of programmes. He is empowered to call a file from any department in order to watch its progress, call a meeting of a Secretary and Heads of Department under him to find out why certain schemes are being delayed and where, and inspect the progress of work in the field. He has the authority to write the confidential reports of the Secretaries to Governments and Heads of Departments with which he is concerned. This system has obvious advantages and we strongly commend this for adoption in other State as well.

4.3 The progress of plan schemes is generally checked through various progress reports obtained monthly, quarterly and annually from the Departmental Officers. In some cases even fortnightly demi-official letters have been prescribed. The Committee is of the view that for too many directives are being issued from the top, with too little supervision and effort to look to matters on the field. There is a general feeling that field officers have been burdened with far too many returns. In several States, as many as 30 to 40 returns have to be prepared and submitted to higher authorities every month. Coordination does not mean multiplicity of reports and returns. The Committee is of the opinion that wherever committees exist for purposes of coordination, they should meet frequently on predetermined dates, say, the first of every quarter or the month. Such meetings should receive priority over other official engagements. Representation on these Committees should be personal and not through subordinates. These Committees should concentrate on the complicated problems which are awaiting solutions, and to make them effective, sufficient power and authority should be vested in them.

Coordination of Research, Extension & Educational Programmes.

4.4 All programmes of research should be examined by working parties (Research Programme Committees), consisting of specialists in the subjects concerned. The reports of these working parties may further be examined by a Research Committee, consisting of Heads of Research Sections, Professors of principal subjects, and Principals of Extension Training Centres and the Deputy Directors of Agriculture. As in some States, this Research Committee may have Regional Advisory Committees for suggesting research problems which should be of a more practical and less academic nature. These Advisory Committees should include all District Agricultural Officers, leading farmers and selected Agricultural Extension Officers and Farm Managers.

4.5 Similarly, there should be a Committee at the State level for dealing with the extension programmes. This Committee should receive district-wise programmes for extension work from the Deputy Directors of Agriculture. The heads of Research Sections should also submit a list of research recommendations which are suitable for extension. The District programmes should be discussed at the Advisory Committees, consisting of District Agricultural Officers, Principals of Extension Training Centres and Basic Agricultural Schools, Agricultural Extension Officers, other Subject-matter Specialists and leading farmers.

4.6 The educational programmes should be prepared by an Educational Programme Committee at the State level. The Committee should deal with education at different levels—post-graduate, under-graduate, Village Level Workers', Agricultural diploma, farm leaders and farmers. The training programme prepared by the heads of various training institutions should also be considered by this Committee. The programme in case of farmers, farm-leaders and the Village Level Workers should be drawn up initially at the divisional level, at which the District Agricultural Officers, Principals of Training Centres and leading farmers should be represented. The training programme for under-graduate and post-graduate levels should be drawn up at a meeting of Heads of research sections, principal Professors and Principals of Colleges. At the State level committee, there should be representatives from research, education and extension wings of the Department, as well as, Community Development.

Coordination between Irrigation and Agriculture Departments lacking.

4.7 The Committee has observed a gross lack of coordination between the Irrigation and Agriculture Departments, both at the level of planning and of execution in the field. This has already resulted in the irrigation resources not being fully utilised. The Departments of Irrigation, Cooperation and Agriculture and the common Extension agency of Community Development, should work as a team, with the sole object of assisting the farmer to intensify production.

4.8 Each Superintending Engineer for Irrigation should have an Agricultural Officer, whose duty should be to serve as a liaison between the agriculturists and the Irrigation Department. In special Irrigation Projects, the State Departments of Agriculture are often neither consulted nor associated. The Committee is of the opinion that in all irrigation projects, the State Departments of Agriculture should be taken into confidence from the very beginning and special Agricultural Officers should be attached for ensuring maximum utilisation of water.

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concept of soil conservation*

CHAPTER V

EVALUATION AND ASSESSMENT OF DEVELOPMENT WORK

Unit for evaluating progress.

5.1 There must be a small unit at the Headquarters of the Director of Agriculture for evaluating and assessing the progress of new extension recommendations, land development schemes (reclamation, minor irrigation, drainage and soil conservation) and schemes for the training and organisation of the farmers. This unit may carry out every year, detailed studies of three or four schemes which have recently been launched, and also undertake a broad review of additional four or five selected items of work. This will help the Department of Agriculture and the Government in revising procedures and avoiding pitfalls. This unit should serve as the eyes and the ears of the department of agriculture.

Evaluation by Research Officers.

5.2 In addition to this, the Heads of Research Sections should arrange to study and evaluate the progress made in extending the recommendations of research officers and translating them into field practices. This study should cover a fair cross-section of the country and should be carried out preferably by experienced officers of the research sections.

Supervision to promote follow-up.

5.3 It is sometimes noticed that owing to pressure exerted for completing a certain quantum of developmental work and spending the amount provided for the purpose, adequate follow-up is often neglected. A feeling generally develops, even in good officers, that their duty is duly discharged once they have completed the specified work or distributed the aids such as seeds, fertilisers, implements, insecticides and fungicides supplied to them. For proper use of these facilities by the farmers, it is necessary that they should be trained and convinced of the usefulness of the facilities and organised in such a manner as to promote their fullest use. For bringing about the necessary change in the outlook it is necessary to change the items of reports, so that the reports contain information about the number

of works completed, as well as the actual area benefited. The emphasis should be placed more on actual achievement and not so much on the potential created. The inspecting officers of the agricultural department can during their inspections, assist considerably in emphasising these points by making a study of the follow-up programme and the use to which a particular facility is actually placed. An intensive drive to promote follow-up work needs to be built up. In order to achieve this, it would be necessary to intensify supervision.

Need for thorough inspections.

5.4 It is felt that inspection and supervision have, since the last war, been relegated to the back-ground and have been replaced by ad-hoc short visits for solving immediate problems or for gathering urgent information. This seems to be due largely, to a rapid expansion in the agriculture departments and a change in work loads arising from a change in emphasis to developmental work. Inspection notes of Agricultural Officers deal mostly with accounts and audit irregularities and the procedure dealing with supplies of seeds and fertilisers, rather than the technological standards adopted in Demonstration and Extension, and the special technical modifications required to suit the local conditions.

5.5 Apart from casual and ad-hoc visits, systematic and thorough inspections covering all the facets of the work of the officers are necessary for the proper training of the officers. Inspection of technical work at different levels, particularly in research and extension, also appears to be inadequate. Either the inspecting officers have too large an area to cover, or properly qualified staff is not available in adequate numbers for discharging this important work in the agricultural departments. Inspection notes do not normally give detailed technical guidance based on the field observations of the inspecting officers. The manner and system of technical inspections, it is understood, has been laid down in departmental procedures, but their observance has not been insisted upon or checked at different levels periodically. In the opinion of the Committee these instructions need to be implemented. The work-loads of inspecting officers should also be studied. The Committee is of the view that a complete and detailed inspection in a small area will give results of much greater value than inadequate supervision over a larger area. Each Technical Officer should be responsible for a minimum number of visits to the units under his control. Such visits should be purposeful and pre-planned to provide solutions on the spot at the time of inspection and should also be utilised to check up whether the unit has acted upon earlier advice and instructions given, and if so, on correct lines.

System of oral reports.

5.6 The Committee is strongly of the opinion that senior officers should be in continuous touch with the work in progress under their control by having a system of oral reports from officers immediately below them, on a prescribed date in a week or a fortnight. This will also provide an opportunity for officers at all levels to discuss with their senior officers, local problems, periodically, and help the senior officers to keep the work with which they are concerned under a continuous review.

CHAPTER VI

PROGRAMME PLANNING

Evolution of Agricultural Production Programme since 1942.

6.1 The evolution of agricultural production programme can be classified in three distinct phases. During the first phase from April, 1942 to September, 1946, rice supplies from Burma were cut off due to war and in order to meet the demand for food, production of crops had to be increased within the country. A Grow More Food Campaign was launched with the main objectives of, (i) switching over from cash crops, mainly short staple cotton, to food crops, (ii) intensifying cultivation of cultivable lands through irrigation, better seeds and manures, improved farming practices, and (iii) extensive cultivation through bringing under plough fallow lands and reclamation of cultural waste lands. For promoting the campaign the State Governments were given financial assistance in the shape of loans and grants. During this period no targets of food production were fixed.

6.2 During the second phase, beginning from the year 1947-48, the campaign was sanctioned for another five years on a planned basis. For a period of five years, a target of 4 million tons of additional food production was fixed for the country. In August, 1947 the partition of the country further aggravated the food problem and in September 1947, the Government of India appointed a Foodgrains Policy Committee under the chairmanship of Sir Purshottamdas Thakurdas. The Committee recommended :—

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- (i) Greater attention to minor irrigation works, development of local manurial resources and distribution of improved seeds.
 - (ii) Plans for production of fertilisers.
 - (iii) Survey of groundwater resources with a view to undertaking tubewell construction.
 - (iv) Setting up of a Central organisation for undertaking reclamation and development of waste lands.

6.3 Towards the close of 1948, the Government of India realising the urgency of the food problem, invited Lord Boyd Orr to review the working of the campaign. He recommended that the whole campaign should be placed on an emergency footing and the bottlenecks of supply and movement

of essential materials for agriculture should be removed. He also suggested a coordinating agency at the Centre and in the States with wide powers. In the light of these suggestions, a Commissioner of Food Production was appointed by the Government of India in July 1949 and the States also appointed corresponding officers. Sub-committees of the Cabinet were set up in all the States, with the State Food Commissioners as Secretaries for taking quick decisions and implementing policies without delay. The objective was to attain self-sufficiency by March 1952 and for this purpose the target for additional production was fixed at 4.8 million tons over the production 1947-48.

6.4 In order to meet the acute shortage of cotton and jute, subsequent to devaluation and the difficulty of getting those raw materials from Pakistan, a policy of increasing production of cotton and jute along with food-grains was announced in June, 1950.

6.5 It would thus be seen that right from 1942, special efforts have been made to increase the production of food and other agricultural crops. In the beginning, the schemes undertaken concerned with the supply and distribution of seeds, fertilisers and oilcakes. Later on about 1947, land development schemes, dealing with minor irrigation and reclamation were undertaken. Soon after, schemes connected with flood protection, drainage and lifting of water were also organised, as a part of the Grow More Food Drive.

Change from Extension to supply functions.

6.6 In some States, the Agricultural Officers were entrusted with the work of supplying coal, iron and cement required for agricultural purposes. Thus, gradually and imperceptibly, the propaganda or the Extension branch of the Departments of Agriculture was converted into a machinery for executing land development works and for distributing supplies, such as fertilisers. The principal task of educating the farmers for adopting new methods of cultivation receded into the background and the concept of benefiting the farmer by supplying him the required materials or by carrying out the required land development scheme came to be recognised as the principal task. These benefits could be secured by only those farmers who had the necessary funds to invest on the purchase of fertilisers and seeds or for carrying out land development projects, leaving out a vast majority of farmers who do not have the necessary money to invest because they live on a subsistence level. The issue of fertilisers and seeds on credit, either through Takavi or through Cooperative loans was the next step taken for benefiting a larger section of farmers. The provision of credit for fertilisers

and seeds was handicapped because some of the farmers were not credit-worthy persons. The procedures for granting and realisation of the loans are regarded as unsatisfactory by the farmers, and, therefore, some of them are reluctant to apply for these loans even when they are credit-worthy.

The Role of Agricultural Departments in policy making.

6.7 Agricultural Departments have no effective say in framing policies which contribute to production. In some States it was felt that although Blocks were sometimes peculiarly different from each other, but the pattern of work and allocation of funds was uniform and rigid. This often resulted in a lopsided development which did not always give maximum returns in the shape of food production within the minimum time available for achieving the same. In dry areas, for example, the programme for irrigation and of soil and water conservation should receive much greater importance than in other areas. In areas of assured rainfall and where irrigation facilities are fully developed, for a crop like paddy, there is greater scope for the expansion of the fertiliser distribution programme and a programme for the adoption of leguminous crops, both for green manuring and for forage. Concentration of effort in a similar pattern in other areas may not bear adequate fruit. The difficulties experienced in establishing Seed Farms for the ultimate purpose of saturating the entire country with seeds of improved variety of crops, can be attributed largely to the uniformity and rigidity of pattern adopted in the initial stages. It is a matter of common experience that improved crop varieties have not made the same impact on our production plans where important factors like supply of water, the level of fertility of land and of soil conservation measures taken, are limiting the production of crops. An equal emphasis on a programme for the supply of seeds of improved varieties of crops, in all areas without taking into account firstly, the efforts made and the success achieved in this direction in the past and secondly, the level at which other factors of production are operating, is not likely to give returns commensurate with the money spent. In certain areas and regions, the construction of an embankment or bund for the conservation of water and soil might be relatively, so important and pressing that it might be futile to extend or expand any other activity looked at purely from the angle of increased crop production. In another area or region, any effort to maximise production through the introduction of "Hybrid" crops such as Hybrid maize or jowar may not achieve the desired measure of success unless a "technological balance" is maintained by ensuring an adequate supply of nitrogenous fertilisers and irrigation water. Improved varieties of crops are intrinsically high yielding genotypes, but these qualities are best realised when the crop is given an adequate supply of water and fertilisers. The present level of yield in Japan, for instance,

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has been reached within the last 50 years by practising intensive methods ; growing of improved varieties is practised in conjunction with the fertilisation of fields. It is believed that for best results from improved varieties, intensive manuring of fields is necessary ; and vice versa, that for best returns from the application of manures and fertilisers, improved varieties should be grown. The importance of this question is not sufficiently appreciated in countries like ours, where the present level of yield is low. By and large, fertilising practices are among the most important factors influencing the level of production of crops. In areas suffering from chronic deficiency of nitrogen or phosphate or both, any effort to lay emphasis on other aspects of the programme will be merely to fritter away the limited resources available. Although, Experimental Stations in the country have collected considerable scientific information on the manurial requirements of crops, specially paddy, this has not been translated into practical application. We entirely agree with the view expressed by Foodgrains Enquiry Committee (1957) that fertilisers are of fundamental importance (paragraph 9.13 of the Report). In a state over thirty five lakh acres were said to be 'Water logged', but no scheme had even been included in the State Plan to effectively check this menace and its adverse effects upon production. If adequate emphasis was given to programme planning, a serious omission of this kind would not have been possible. We have already recommended earlier in this report (paragraphs 2.4 and 2.5) that both in the States, as well as, at the Centre, Committees consisting of eminent agricultural administrators, scientists and progressive farmers should be appointed, once in five years, to examine programmes and policies so as to provide a balanced growth by enunciating programmes and policies in consonance with existing needs. *for com a commit it.*

Self Help Programmes.

6.8 In a few States self-help programmes were developed which could benefit the small farmer, who is generally non-credit-worthy in the usual sense of the word. These plans were based on the supply of small quantities of nucleus seeds to the village—often as low as a pound or two per acre of paddy in a village. The farmers of the village were organised for multiplying the seed locally and for distributing it in the village. This process at once decentralised the multiplication and reduced the quantities that were handled, transported, stored and distributed by the Government.

6.9 For building up soil fertility, a programme of green manuring was organised in irrigated areas on a self help basis and for non-irrigated areas

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a campaign for the production of adequate compost was launched. Simultaneously, efforts were made, though half-heartedly, to organise the planting of fuel trees and shrubs with the object of eliminating, ultimately, the conversion of cow dung, a valuable source of manure, into fuel for cooking purposes. Farmers were given a handful of green manure seed which they were to sow in a nursery and transplant around their paddy field for multiplying the seed for use during the succeeding year. Similarly, small quantities of seeds were supplied to the farmers for planting shrubs on the borders of their fields for producing additional green material for composting and for producing fuel. The main advantage of this vital programme which assisted in building up the fertility of the soil with materials produced by the farmer on his own field and with his own labour and within his small means, without affecting adversely the production of crops that he was traditionally taking, was that it could be carried out by small farmers without depending upon outside assistance and could unquestionably benefit extensive areas and a very large number of farmers. These three basic items, *viz.*, green manuring, production of compost and planting of fuel trees are capable of almost universal adoption, leaving the Department of Agriculture free for carrying out their educational campaign and do not involve handling and distribution of large scale supplies or disbursement of funds. The local multiplication of seed, the production of local manurial resources, and the production of additional fuel for the farmer are the three problems which can be taken over extensive areas all over India, provided the persons who are to develop these and educate the farmers are left free to do this work, and provided necessary encouragement and drive is imparted for the purpose.

6.10 With regard to plant protection measures, the time of spraying or dusting is very important from the point of view of effective control. Governmental agency, howsoever efficient, cannot go to each field in time and undertake the necessary crop protection work. Farmers should be persuaded and helped to own equipment and insecticides, either cooperatively or individually, while the departments should organise demonstrations and a pest warning service, and should keep available bigger power equipments to combat pests and diseases in an epidemic form.

Programme to be evolved from the village level.

6.11 The Agricultural Departments should evolve plans for increasing agricultural production in every village rather than for executing the targets of distribution of fertilisers and seeds and of executing the various land development schemes in the Second Five Year Plan. If integrated plans for increasing the production in a village are prepared and executed, the

targets prescribed for the Second Five Year Plan will be taken care of automatically, and even if these targets are not achieved, it would not matter, so long as agricultural production in every village is pushed up. At present, we have a spectacle of financial targets being fulfilled without the proportionate additional production being realised. The existing practice is to break up district-wise the State targets for schemes of land development or for distribution schemes and then break up the district targets into Tehsil and Block targets. The village agricultural plans are attempted on this basis. In this process, the resources are locked up in the areas which are slow moving and those which move faster are hampered because of lack of resources. It is, therefore, suggested that initially 50% to 60% of the resources should be earmarked for an area to be utilised in 4 to 6 months and when a substantial portion of this has been spent, additional amount should be given according to performance. If this procedure is adopted the locking up of resources could be reduced.

6.12 In conclusion we can do no better than quote extensively from a stimulating article by Dr. Douglas Ensminger published in a recent issue of the "Kurukshetra",

in combined practices

"However effectively the agricultural departments reorient and administer their technical services, the key to solving India's food production rests, in the final analysis, on the participation of village people. The national community development programme, therefore, must be the nation's instrument for mobilising village interest and leadership, providing the educational guidance, and in effectively organising all the technical and supplementary production resources of the nation for the task of getting the villages to adopt the improved agricultural practices at the earliest.

"The community development programme must also, therefore, give priority attention to increasing food production. To do so in no way changes the basic objective of community development. Community development's all-important objective is, and will remain, the guiding of self help development programme in the villages, through educational means. The achievement of this type of programme means educating and encouraging the village people to look to themselves for the leaderships for the organisations, and the finances needed to solve their problems—problems largely related to hunger, disease and ignorance.

"While the community development staff can through education, help village people become conscious of their problems, and stimulate an interest in wanting to change, the actual changes both in attitudes and behaviour must come from within the people. These outside stimuli of education must become inner motivations; and village leaders must be encouraged and trained to help their people adopt and develop these motivations. Further, if village people are successfully to accept and apply to their daily lives the recommended new ways of making a living, as well as to adopt

better ways of living, they must be helped in building effective village organisations to serve as instruments of change and development.

"In the educational process of community development, the village people must from the beginning be helped to understand that they themselves must create new wealth, if they are to be able to have better education, health, housing, recreating, and better family living. Village people must understand that the new wealth needed for education, health, etc., can come only from the soil, and that they can have the new wealth only if they will give up their old farming methods and take to improved ways of farming.

"For community development to play its full role in mobilizing and guiding the nation in a massive effort to free itself from hunger, it must, on an urgent basis, put into action a policy decision it has already, and recently, taken. This decision is to give the highest priority attention to two things one, to helping each village cultivator have an individual farm plan for changing to improved practices, and the other, to helping each village community have an effective panchayat and cooperative for encouraging and helping service their efforts to increase food production.

"Taking a policy decision and issuing directions to give food production priority is but one step. The other and perhaps the harder step is carrying out this policy through a coordinated programme of work for the entire block staff.....

"To have won freedom from foreign rule gave India its opportunity to develop. To win freedom from hunger will provide India the means to develop. As it does, so the million of India's people will have for the first time an assurance of enough to eat. To most of them, that assurance will be one crowning fulfilment of their expectations of national freedom."

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CHAPTER VII

BUDGETTING, SANCTIONS, PROCEDURES AND DELEGATION OF POWERS

Existing procedures retard progress.

7.1 The existing procedures of budgetting and the incurring of expenditure act as a deterrent to progress in the speedy execution of schemes in the agricultural sector. These procedures are generally applicable to all sectors of the Plan but in the field of agriculture especially, which has to deal with the production of food for the common man, their effect is particularly felt. This is because, in the sphere of agriculture unlike other sectors, the nature and extent of operations are to a large extent dictated by climatic considerations, e.g. seasons, rainfall, etc. Particular seasons of the year are propitious only for particular operations and certain activities cannot be taken up if the necessary climate does not exist. Once commenced, the time available for completion of such operations is also limited. It is, therefore, necessary before the onset of a season during which particular operations are to be undertaken, to mobilise all the resources needed so that they are commenced in due time and after commencement, there is no risk of their interruption. This will not be possible unless the appropriate financial sanctions are available in time.

7.2 The Committee have noticed that there is considerable gap between the physical targets and actual achievements for various agricultural schemes. This short-fall has often been ascribed as being due to the late receipt of financial sanctions. The delay naturally limits the amount of work that can be done in a particular year. Seasons do not wait for sanctions and late sanctions, inevitably result in partial work being done or no work being done at all. We were given instances where sanctions for plan schemes had not been received throughout the financial year to which they related, although proposals had been submitted by the Head of the Department at the beginning of the year. Such delayed sanctions also contribute to a state of affairs met with in many States in which the bulk of the expenditure budgetted for the year, amounting in some cases to as much as 80% of the provision, is incurred during the last quarter of the year. Though the funds in every case may ultimately be spent, the results are not commensurate with the expenditure because of its not being incurred at the appropriate time. "It must never be forgotten", observed the Prime Minister recently,

“that nothing is more expensive than delay”. The concentration of expenditure during the last three months as mentioned above, is the antithesis of planning and is not conducive to the methodical and even implementation of the plan schemes. Means have to be devised to ensure that the expenditure is spaced out throughout the year on as uniform a basis as possible.

System of budgetting.

7.3 Under the present system of budgetting for the Agriculture sector (which may be true of other sectors also), action to include the necessary provision for plan schemes eligible for Central assistance for a particular year is initiated some time in August-September of the preceding year. The authorities subordinate to the Director of Agriculture, at a suitable level, forward their recommendations to the Head of the Department, who after scrutinising them, transmits them to the Secretary to the Department of Agriculture. After approval by Secretary, with such modifications as may be necessary, they are referred to the Finance Secretary who returns them to the Agriculture Secretary after examination in his department. The schemes are then forwarded to the Government of India and are discussed in January, February between the Planning Commission, the Central Ministry of Food and Agriculture and representatives of the State Governments. The schemes finally approved for implementation together with the provisions therefor and the share of the State Governments and the Government of India in terms of loans and grants, are then indicated.

7.4 After the Central budget is voted by Parliament, on a request by the State Governments, sanctions are issued by the Government of India after detailed scrutiny of the schemes submitted, in consultation with the Central Finance Ministry. This scrutiny at the Centre after the voting of the budget has been considered essential, as the schemes are not presented in sufficient detail at the time budget provision is included. After obtaining the sanction of the Government of India, the State Department of Agriculture has again to apply to the State Finance Department for funds in respect of such schemes. A similar procedure is followed in respect of schemes financed entirely by the State except that these are not referred to the Government of India for sanction.

Improvements suggested.

7.5 It will be observed that the above procedure envisages consultation with the Finance Department on two occasions, namely, before a provision is included in the budget and later after the voting of the budget and before expenditure sanction is accorded. While a strict scrutiny of schemes is necessary in the interest of wise spending and cannot be dispensed

with, the Committee are of the view that the various stages of action from the formulation of a scheme to its implementation should be completed more expeditiously and unnecessary stages eliminated. It should be possible, for example, to reduce the number of inter-departmental references and expedite decisions if the system of personal discussions among officers was encouraged, in preference to the practice of referring matters from one department to another in writing. Conditions should be created in which a Plan scheme can be commenced immediately on the advent of the financial year, instead of being held up due to delays in administrative or financial sanctions. In particular, in respect of schemes spread over a number of years, the issue of administrative and expenditure sanctions during the second and succeeding years should be regarded as a formality only and not interfere with the continuing execution of such schemes while awaiting the sanctions. The issue of sanctions without undue delays can be achieved if the necessary technical and financial scrutiny of schemes is completed before financial provisions for them is made in the budget of a year. This presupposes the preparation of the schemes, initially, in greater detail than is done at present and it might be useful for the financial authorities who would scrutinise them to indicate before-hand through instructions, the minimum data which should invariably be furnished before budget provision is accepted. The technical and financial pre-budget scrutiny referred to above will naturally take some time and the suggestion, therefore, involves re-adjustments in the calendar that might have been laid down for the preparation and presentation of the budgets in the State legislatures.

7.6 There may also be schemes in respect of which, either because of their magnitude, or because of other reasons, it may not be possible to complete a detailed examination of a scheme prior to its inclusion in the State budget. In such cases, a lump sum provision may be made and expenditure sanctions issued after detailed scrutiny in consultation with the State Finance Department. Pending such sanction the State Government can authorise the incurring of expenditure on preliminaries subject to certain financial limits.

7.7 If the above recommendations are accepted and provision in the State budgets is ordinarily made only after detailed scrutiny of the Plan schemes, there should be no necessity for a second reference to the Finance Department for expenditure sanction. It will be possible for the States to accord administrative approval immediately after confirmation is received from the Government of India of the acceptance of a particular scheme for Central assistance and the Plan provision, so that all preliminary work is undertaken; in respect of schemes financed entirely by the States, such approval may be accepted on the basis of their inclusion in the budget.

This will enable the actual implementation to be commenced on the 1st April, the expenditure sanction being accorded as soon as the budget is voted by the States legislature.

Revised procedure.

7.8 In respect of State schemes involving Central assistance, one of the factors which had contributed to the delay in their implementation in the past had been the time taken in obtaining the Government of India's sanction to such schemes and particularly to the Centre's share of expenditure. These sanctions were accorded after a detailed scrutiny of the schemes from the technical and financial angles. Under a revised procedure which has been introduced this year and will apply *inter alia* to the agricultural sector, the schemes in State Plans for which Central assistance is to be made available will be sanctioned by the State Governments under their normal procedure and no financial sanctions as such will be issued from the Centre. A substantial portion, namely three-fourth of the assistance to which a State Government is entitled is made available as ways and means advances by the Central Finance Ministry in nine equal monthly instalments commencing from May. These advances will be cleared later in the year by the issue of formal sanctions to loans and grants. Under this system, the acceptance by the Government of India of a scheme for inclusion in the budget after scrutiny will constitute necessary authority for the State to proceed with its implementation and the grant of ways and means advances should obviate difficulties due to non-availability of funds.

7.9 The above procedure will apply to schemes of Cooperative development (other than Cooperative farming and Cooperative training) and the National Cooperative and Warehousing Board subject to the proviso that the procedures prescribed at present for receiving schemes and giving technical approval to them will not be affected.

7.10 A copy of the letters issued by the Government of India, Planning Commission, No. Plan/5/2/57 dated the 12th May, 1958, and the Ministry of Finance (Department of Economic Affairs) No. 2(17)-PII/58 dated the 12th May, 1958, explaining the revised procedure is attached (Appendix VIII). The State Governments feel that parallel action in decentralisation should also be taken in the National Cooperative Development and Warehousing Board and the Reserve Bank. The Committee endorse this view.

7.11 It will further be observed from the Planning Commission's letter dated the 12th May, 1958, that the States have now been given discretion to divert funds from one scheme to another, if necessary, having regard to their comparative importance, pace of implementation, etc. The schemes pertaining

to the Agriculture sector (including Animal Husbandry, Dairying, Fisheries, Forests, Soil Conservation and Cooperation) have, for this purpose, been constituted into groups and heads of development and the States have been given authority to regulate the expenditure within each group without reference to the Government of India. Where the total expenditure under one group is proposed to be covered by reduction of expenditure in another group within the same head of development or where adjustments between two heads of development are involved, these may be carried out in consultation with the Ministry of Food and Agriculture under advice to the Planning Commission.

7.12 It is hoped that the introduction of pre-budget scrutiny of plan schemes in conjunction with the revised procedure for the sanction of loans and grants for Centrally assisted schemes and the discretion now given to the States to regulate the expenditure according to actual needs will go a long way in removing one of the principal bottle-necks in the execution of schemes attributable to financial procedures.

Procedure for Union Territories.

7.13 A procedure similar to that followed in respect of State schemes which are assisted by the Centre, is also being followed in respect of agricultural schemes in Union Territories. The expenditure on such schemes is met by the Government of India and budget provision is made by the Home Ministry in consultation with the various administrative Ministries concerned with the subjects and the Finance Ministry. After the budgets are voted, sanction for the implementation of these schemes has to be obtained by the Administrations of these Territories through the Home Ministry who again refer to the Administrative Ministries and Finance. We suggest that this second reference to the Government of India should be dispensed with.

Organisational improvements.

7.14 As a further step towards improving the system of budgetting and expenditure control, the Committee recommend that certain organisational improvements may also be undertaken. At the Centre, each Administrative Ministry now has an Internal Financial Adviser to render financial advice generally and in particular, assist in the formulation of proposals in the budget from their inception. The Committee would suggest that if a similar system were adopted by the States and Financial Advisers were posted to the State Departments of Agriculture as part of the establishment, the financial processes connected with the formulation and implementation of Plan schemes would be considerably expedited. It is, however, essential

that this adviser should have definite powers to take decisions on behalf of the Finance Department. His appointment should facilitate expedition in disposal and he should not be permitted to become an additional channel of approach to the Finance Department. Under the present system of financial scrutiny, Plan schemes are scrutinised in State Finance Departments by officers who have not had actual experience of developmental work. Without questioning their ability, the Committee considers that it would be of great advantage if the officers of the Finance Department charged with the scrutiny of such schemes had actual experience of the formulation and implementation of Plan schemes in one capacity or another.

Implementation suffers due to lack of powers.

7.15 It has also been represented to us that even after the funds provided in the budget are sanctioned, often the implementation of projects has suffered due to the lack of powers of the officers entrusted with such implementation. The tendency appears to be to concentrate all powers in the hands of a few officers at the top. Such concentration naturally, impedes the execution of schemes, as considerable time is lost even in case of duly approved schemes in obtaining sanctions by individual officers at the different levels, because their normal financial powers under standing regulations and instructions are limited and they have to approach higher authorities for relaxation of rules every time expenditure exceeding the limit laid down in their financial powers has to be incurred. There seems to be also some confusion as to whether after a scheme has been sanctioned, it is still necessary to obtain sanctions again for the individual component parts of the scheme. To illustrate the point, if a scheme of soil survey was sanctioned involving expenditure on staff, technical equipment and office equipment, it transpired that apart from the sanction to the scheme as a whole, it was necessary to obtain separate sanctions to the staff and equipment. This appears to us to be unnecessary.

Delegation of powers at all levels.

7.16 The Committee recommends that in the interest of speedy execution of work, there should be the greatest delegation of powers at all levels from the Director of Agriculture downwards. The powers that could be exercised only by the senior officers should be clearly specified and these might be added to or otherwise amended on the basis of experience. In respect of matters not specifically reserved for consideration and decision at higher levels, the officer implementing a programme, irrespective of his position in the hierarchy, should be enabled to operate on his own without making frequent references to higher officers. The existing rules and regulations governing the financial powers of different officers were framed several

years ago with reference to the prices prevailing at that time. With the increasing cost of living and the rise, four to five times, of the cost of commodities, it is essential that these powers are revised upward. Some of the States have already undertaken a review of the relevant financial regulations. This practice is, however, not uniform. If developmental works have to be executed expeditiously with the expenditure spread out evenly during the year, it is essential that the financial powers of officers at all levels are examined urgently and, where necessary, revised so as to conform to existing prices of commodities, and changing needs of the expanded developmental programme undertaken by the country. This would be a matter to be taken up by each State.

7.17 In undertaking this revision, the following general observations may, however, be borne in mind :

- (i) Liberal powers for the purchase, sale, write off and repair of tools, equipment, materials (seeds, fertilisers, plant protection materials, apparatus and chemicals) should be granted to the officers of the Agricultural Department. Certain restrictions which are operative in other departments may have to be relaxed in the case of Agricultural Departments.
- (ii) Procedures for purchase and sale may be prescribed and so long as these procedures are followed it need not be necessary to obtain a sanction from higher authorities subject, in the case of purchases, to the funds having been provided in the budget and the items being of very common use viz. seeds, fertilisers, manures, cattle feed, oil cakes, implements, fungicides, and insecticides.
- (iii) Administrative powers to grant casual, and earned leave, and to inflict minor punishments including censure and warning should be generally vested in the immediate superior and appeals should not be beyond the level of the second superior officers.
- (iv) Authority to countersign contingent bills and travelling allowance bills should normally vest in the first gazetted superior.
- (v) All heads of sections should have full powers to transfer their non-gazetted subordinates within their normal jurisdiction.
- (vi) Existing procedures regarding the sanction of purchase of bicycles, typewriters, calculating machines, office clocks and furniture need simplification and liberalization.
- (vii) Powers to rent godowns should be liberal for the officers who are

required to purchase, stock and sell large quantities of materials. These officers should have powers to incur handling and transport charges according to the prescribed methods or scale.

- (viii) The Officers in charge of farms, laboratories and workshops should have authority to carry out minor urgent repair in Government buildings within certain ceilings and funds should be placed regularly at their disposal.

7.18 The powers delegated should be such that the officers' main task is not impeded because of lack of powers, e.g. the Principal of an Agricultural College may have wide powers in respect of purchase of books or of apparatus and the Agricultural Engineer in respect of purchase of machinery, etc. It should further be provided that in an extreme emergency any officer may exceed powers formally delegated to him without being called to account, subject to the condition that he renders an immediate report to the higher authority justifying his action.

7.19 For convenience we have suggested in Appendix IX the financial and administrative powers which may be delegated to officers at various levels in the State Agriculture Departments. State Governments may follow this as a guide while undertaking a revision of the powers of their officers on the lines suggested by the Committee.

7.20 After the above delegations are made, steps should be taken to codify all financial and administrative powers now distributed over different books and executive instructions. In brief, officers, supervisory, executive or otherwise, at all levels, should have a clear indication of their financial and administrative powers.

Restrictive orders to be revised.

7.21 Even in regard to the powers that have been delegated, the officers concerned felt circumscribed in the exercise of these powers as it was hedged in by so many restrictions, issued from time to time that for all practical purposes they nullified powers given to them by the standing regulations such as the General Financial Rules. Even after the financial powers are revised upward, the issue of executive instructions from time to time will act as a strangle-hold on the exercise of the normal powers. It is not surprising that there is a growing feeling among even responsible officers that Government were not trusting their officers enough. This feeling is not conducive to officers taking initiative and responsibility and should be removed; the delegation of additional powers should be both in letter and in spirit. The Committee would, therefore, strongly recommend that

executive restrictions of the nature referred to, which circumscribe normal financial and administrative powers of officers, should be issued only sparingly and for very weighty reasons. There should be a periodical review of such instructions every six months with a view to removing them or writing them into the normal rules if they are to become permanent. On no account temporary restrictions should be allowed to be effective for more than six months without a further review preferably by a Committee appointed by the State Governments. In order, however, to have a check on how the additional powers are exercised, a periodical statement can be obtained and inspection by qualified officers may also be arranged.

Ad hoc Financial powers.

7.22 In addition to the enhancement of normal financial powers of officers, each officer can be given, as an ad hoc measure, power to execute specified schemes for which budget provision is accepted, without obtaining further sanction on any item of expenditure under that scheme even though such expenditure may exceed his normal financial powers. Such ad hoc authorisation may be effective during the particular financial year and give absolute power to certain officers on important schemes within the ceiling of the budget provision and subject to their observing other codal formalities. This procedure could be particularly adopted to speed up plan schemes which are lagging behind for various reasons.

Authority to make direct purchase.

7.23 The procedure requiring that all stores required for the public service should be purchased through a Central Purchase Organisation in States where they exist was also cited as a factor impeding the execution of Plan schemes. While centralised purchase has its advantages in that due to the pooling of requirements and by virtue of its position as one of the largest single customers, the Organisation is able to buy the stores at the most favourable rates, the procedure is often time-consuming. In respect of the purchase of technical stores, the Central Purchase Organization cannot obviously be expected to include a large number of specialists capable of advising them and not infrequently the indenting Department itself is requested to advise on the suitability of particular stores. Much labour and time will be saved if in such cases and in cases where a large number of articles of petty value are required urgently, the indenting departments are authorised to effect purchases direct after observing the codal formalities.

7.24 In the matter of State transport dealing with essential food production work such as transport of manures, seeds, implements, etc., it was

observed that inspite of the fact that officers have appropriate financial powers to execute repairs, such repairs should be undertaken in State Workshops. In view of congestion in the State Workshops, long delays occur in the execution of repairs with the result that such transport is out of commission for long periods and the work turned out is not proportionate to the funds spent in the maintenance of staff connected with such schemes. In our opinion, it would be necessary to give discretionary powers to officers who are in charge of State trucks to get the emergency repairs done even outside the departmental workshops, where the interest of public service justifies departure from the normal rules. The main objective should be that these trucks should be put to the maximum use in a year instead of remaining idle for various reasons.

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CHAPTER VIII

SUPPLY PROCEDURES

8.1 The procedures relating to the supply of chemical fertilisers, improved seeds, insecticides and pesticides which have a direct bearing on agricultural production were examined by the Committee in several States. The methods of distribution vary from State to State.

Supply of Nitrogenous Fertilisers.

8.2 The distribution of nitrogenous fertilisers both, imported and home produced is made by the Government of India from the Central Fertiliser Pool. The demand for nitrogenous fertilisers in the country for food and cash crops is first ascertained from the States and arrangements are then made for their import to meet the overall demand. The Government of India does not exercise any control over the procurement and distribution of phosphatic and potassic fertilisers.

8.3 In order to ascertain the demand, the Ministry of Food and Agriculture normally request the State Governments to submit their annual demand of fertilisers, along with its monthly break-up, a prescribed proforma. On the basis of month-wise break up of demand, the Government of India issue in the month preceding the quarter, quarterly allocations of nitrogenous fertilisers to various States indicating the quantity to be supplied to each State, and the source from which the supply is to be made, whether imported or local. On the authority of the allocations made by the Government of India, the State Governments, in the case of locally produced fertilisers, issue despatch instruction to the factories which have been allotted to them for the supply of fertilisers.

Sufficient supply of fertilisers not available.

8.4 It has been generally felt in the States that not only sufficient fertilisers are not being allotted by the Government of India, but the fertilisers allocated from Sindri and other factories are not received by them regularly and in time for application to the crops. Several reasons have been advanced for this delay. Firstly, railway wagons are not sometimes available in time and the Regional Director of Food or the Ministry has to be approached for obtaining priority from the Railway Ministry for the transport of fertilisers. In one State, transport bottlenecks occur at places

supplied through metre gauge railheads. Secondly, the orders with the supplying factory are not fulfilled according to the allocation chart due to reduced production in the indigenous factories. In the case of imported fertilisers, delays are caused by late arrival of shipments. Thirdly, there is sometimes an unusual rush demand from some States who do not phase their requirements properly from the factories concerned. It has been pointed out that there is generally, a great rush of movement of fertilisers during the second quarter, April to June, which is the main season when fertilisers are required all over the country. Almost two-thirds of the imported fertilisers are also received at the Indian Ports during this quarter. During 1958-59, the Government of India had placed an order for one lakh tons of fertilisers for import from foreign countries. Of this, about 70,000 tons were received during the quarter April to June.

Better advance Planning suggested.

8.5 The Committee is of the view that these difficulties can only be solved by proper planning well in advance of the time when the fertilisers are required in the field.

8.6 It would be advisable to start centrally administered godowns, conveniently situated in several parts of the country, where fertilisers could be received and stored for supply to the consuming centres. Taking into consideration that the present consumption of fertilisers in India averages hardly 4.5 lbs per acre, it is reasonable to suppose that one of the measures required to be taken before we can ensure any substantial increase in the consumption of fertilisers in the near future will have to be the speedy development of warehousing and distributing facilities to enable the country to handle any reasonable quantities of fertilisers needed for her starved soils. The payment of interest charges on fertiliser loans advanced by the Centre to the States, may also have to be deferred till such time as the fertiliser is actually required for use on the land.

Distribution of Fertilisers in the States.

8.7 The responsibility for the distribution of fertilisers to the cultivator mainly rests with the State Governments. The method and the agency for the distribution of chemical fertilisers vary considerably from State to State. The main channels of distribution of fertilisers are through,

- (i) Cooperative societies.
- (ii) Private dealers.
- (iii) Government Departments.

8.8 In some States the distribution of nitrogenous fertilisers is done through the Cooperative Societies. The Cooperative Societies are entirely responsible for storage and organising a net-work of distribution centres, fixed after mutual consultations between the Cooperative and the Agriculture Departments. In some States there are as many as 1350 sub-depots in the State. In some other States, the distribution of fertilisers is done through the Cooperative Societies as well as through private traders. In one State the distribution is carried out entirely by private traders while in yet another, the distribution of fertilisers is carried out through Government depots, Cooperative Societies as well as through private traders. It is felt that adequate storage facilities for stocking fertilisers are not available in the States. Sufficient stocks cannot, therefore, be kept at the distributing centres. The number of distributing centres is also not enough to meet the demand of the cultivators.

Distribution of improved seeds.

8.9 Improved seeds must also be multiplied and supplied to the cultivators in a systematic manner. For this purpose, sufficient quantities of improved seeds, evolved by the research workers, have to be multiplied at Government Farms, as well as, on farms of selected growers, all over the country. Some States have a well planned programme for the multiplication of improved seeds through Registered Seed Growers and have organised an elaborate system of exchange of improved seeds among farmers at the village level. We noticed that in one State an unusual method of procuring improved paddy seed through an open tender advertised in one of the leading daily papers of the State was being adopted. For a commodity like improved seed this procedure is open to serious objection as the purity of the variety cannot be guaranteed. The Committee is of the view that State Departments of Agriculture should not involve themselves in the distribution of non-descript seed and should confine their attention only to the propagation on Government Farms, of improved pedigree seeds of guaranteed purity, which has been inspected and rogued in the field prior to harvesting and threshing of the crops.

8.10 The agencies responsible for the distribution of improved seeds are much the same as in the case of chemical fertilisers. In one State, the Director of Agriculture was not prepared to hand over the distribution of improved seeds to the Cooperative Societies, as he thought that the Cooperatives did not take proper care to maintain the purity of seed. In another State the District Agricultural Officers have been empowered to purchase improved seeds from the Registered Growers in their districts. The improved seed thus bought and also obtained from the State Seed

Multiplication and other Farms is entrusted to the Cooperative Societies for distribution in their areas on a commission basis. The Cooperative Societies, in turn, issue improved seeds to the cultivators on cash or credit basis.

Distribution of improved Agricultural Implements.

8.11 The progress of distribution of the improved agricultural implements depends on the allocation of steel quota for agricultural purposes. We have been informed that this quota has not been coming up in sufficient quantity. In our view the quota of iron and steel for agricultural purposes should not only be given in accordance with the demand made by the States, but it should be allotted and placed at the disposal of the State Agricultural Departments, so that they may organise the manufacture of improved agricultural implements on a large scale.

Distribution of pesticides and insecticides.

8.12 The supply of pesticides and insecticides etc. is made through the Plant Protection Organisations of the State Governments operating through their plant protection centres, distributed in different areas. The pesticides are given at cost price or at subsidised rates under the Grow More Food Rules. Pesticides are also distributed free of cost by the State Plant Protection Organisations, specially when severe pests or diseases break out. Plant Protection measures are also undertaken through the Community Development and National Extension Service Blocks.

8.13 The Central Plant Protection Directorate under the Ministry of Food and Agriculture has also established a number of Central Plant Protection Stations, located at Pathankot, New Delhi, Barabanki, Gaya, Gauhati, Cuttack, Bilaspur, Dharwar, Palampur, Indore, Hyderabad, Eranakulum, Amraoti and Tiruchirapali. The pesticides from the centrally controlled centres are usually given through the State Departments of Agriculture. Besides, there are private firms which import, stock, manufacture and distribute insecticides, pesticides, hand sprayers and dusters. In one State the demand for plant protection service has increased so rapidly that the State Plant Protection Organisation is unable to cope with it. This is being met largely by private organisations selling their products at important centres. It is understood that out of the total value of insecticides and fungicides of Rs. 2.3 crores distributed in the country, nearly Rs. 1.9 crore worth is distributed by private agencies directly through their own sales organisation.

Supply functions of the Department.

8.14 The Committee is of the view that the time has come when the entire organisation for the supply of fertilisers, improved seed, insecticides and agricultural implements must be separated from the truly extension and technical functions of the Agricultural Departments and transferred to the Cooperative Organisations in the States. In the initial stages, these agencies may need certain guarantees for losses incurred, though in the long run, these supply programmes would have to be organised on the basis of self-sufficiency.

Agricultural Credit.

8.15 Furthermore, a programme which seeks to encourage the farmer to adopt better and improved methods of farming should be matched by a suitable credit programme, which will provide the necessary means for the adoption of the new methods, such as seeds, fertilisers, insecticides, agricultural implements etc. During the last few years, the existing organisation for credit has been able to benefit largely the well-to-do and the comparatively richer class of peasants. The small peasant has been largely left untouched and this seems to be the principal reason why the G.M.F. Campaign failed to enthuse the large majority of cultivators to increase production to any appreciable degree. Government policies should be moulded to the needs of the small cultivators and credit facilities extended to them despite the greater risk involved. The small peasant will constitute the basis of the whole structure, and rules and regulations for granting credit facilities should be revised to this end. The total requirements of agriculturists in the country for credit have been computed at Rs. 750 crores in 1951-52 and according to the Plan, Rs. 90 crores were to be issued in 1957-58, whereas all the Cooperative Banks put together did not issue more than about Rs. 57 crores during the year. The existing organisation for credit has not expanded sufficiently to cope with the increasing requirements and steps need to be taken to step up cooperative credit and strengthen the cooperative structure as envisaged in the Rural Credit Survey Report.

CHAPTER IX

MODEL AGRICULTURAL ORGANISATION TO SUIT PRESENT NEEDS

The purpose and functions of the Agricultural Departments.

9.1 If the Agricultural Departments are to fulfil the expectations of the people in the field of agriculture, it is necessary that they must be organised to handle promptly and in an efficient manner the growing demands of the agriculturists. The Departments should not only provide facilities for educating and training the farmers, but also for training the personnel required for manning the services connected with agriculture. Agricultural Departments should demonstrate to the farmers better methods of cultivation and disseminate knowledge about these methods through various audio-visual channels and organise farmers for adopting the improved techniques of crop production and working together for purposes of common benefit in activities such as land development, protection of crops, marketing and organisation of self-help programmes. The department should have the capacity to pick up the problems of the farmers and pass them on quickly to the research sections for prompt solutions and rapidly transmit their solutions back, not only to the concerned farmers, but to other farmers as well. The Departments of Agriculture have in the past regularly secured and supplied certain quantities of seeds, fertilisers, implements, agricultural machinery and plant protection equipment; but we do not regard this to be a legitimate role of the Department of Agriculture, though this certainly is a function of the Welfare State. In our opinion, it is necessary for the Agricultural Extension staff to concentrate solely on educating and organising the farmers to produce more. The Department should deal with technical knowledge and education rather than trade in supplies. The field for extension is as vast as for agricultural research and the Departments of Agriculture should equip themselves for meeting the demands for improved agricultural techniques which are developing fast in all areas.

Agriculture & Irrigation under common Minister and Secretary.

9.2 Though the Committee is aware of the practical difficulties involved in combining under one Minister, a number of portfolios, it recommends that in the States, the feasibility of the portfolios of Agriculture and Irrigation being held by one Minister should be considered as the problems of irrigation,

drainage and flood protection are not only intimately connected with agriculture, but there is a gross lack of coordination between the departments. For rapid progress it appears desirable to place the responsibility for both these fields in a single authority. In one State, we observed that the Agriculture sector was divided among as many as four Ministers and four Secretaries to Government. At the level of the Secretary to Government, it may not be possible in some States to combine Agriculture and Irrigation and place it with one Secretary. We would, therefore, recommend that the feasibility of all the subjects connected with Agriculture being distributed between two Secretaries may be examined. One possible arrangement will be for the Secretary for Agriculture to deal with Agriculture, Land Reclamation, Soil Conservation in agricultural lands, Animal Husbandry and Veterinary Science and the Secretary for Irrigation, in addition to Irrigation, to deal with Forests (including soil conservation in forest areas), Cooperation and Agricultural Marketing. The two Secretaries may have necessary supporting Deputy and Under Secretaries depending upon the volume of work. Frequent changes should also be avoided as they cannot but dislocate administration and result in a faulty pace in execution of work. In one State, the agriculture portfolio at Minister's level has changed hands five times and at the Secretary's level four times since the beginning of the First Five Year Plan.

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Land Development and Works Wing within the Agricultural Department for Minor Irrigation, Civil Works and Soil Conservation.

9.3 At present, the schemes of minor irrigation are dealt with in some States by the Revenue, Cooperation, Agriculture and Irrigation Departments, according to certain prescribed ceilings of costs. In some other States, Agriculture Departments have nothing to do with the minor irrigation schemes. We recommend that the construction of irrigation wells and construction and repairs of small minor irrigation works etc., which do not cost more than Rs. 10,000 should be the responsibility of the Community Development agency. The Agriculture Department should attend to minor irrigation works costing, approximately above Rs. 10,000, but generally not more than about Rs. 80,000. Works costing more than about Rs. 80,000 may be handled by the Irrigation Department.

9.4 The Minor Irrigation Branch of the Agricultural Department should be equipped to bore wells and sink tube wells in suitable areas on behalf of the Cooperative Societies and the individual farmers. In some States, the minor irrigation programmes, including tube-wells, are handled by the Public Works Department. This Department cannot be expected to give as much importance to minor irrigation works as it does to its regular works of much

bigger dimensions. A department which is handling a project like the Bhakra Dam can hardly be expected to pay much attention or importance to a minor *kuhl* in say, the Kangra district. The same holds good for the building programme in the agriculture sector of the plan. The Committee would, therefore, recommend the setting up of a Works Division within the Directorate of Agriculture under a qualified Joint Director with full powers of a Superintending Engineer. This will result in a speedy implementation of both minor irrigation and the building programmes within the agriculture sector. A research division for agricultural implements and machinery should also be added to this circle.

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25 Land Reclamation often involves the testing of soils for ascertaining productivity and the follow up work in connection with the cropping pattern to be adopted. The work of soil conservation on agricultural lands remains incomplete without the follow up introduction of fertility building practices and adoption of cultural methods for conserving soil and moisture. It is, therefore, recommended that soil conservation in agricultural lands should be the function of the Agriculture Department and in forest areas, of the Forest Department, and care should be taken to see that an independent Department of Soil Conservation does not spring up. Land reclamation, minor irrigation, including drainage and flood control, and *other* soil conservation really constitute measures for developing the land and these subjects may well be assigned to a Branch which may be designated as the Land Development Wing or Branch of the Department of Agriculture. As this Branch will consist of *agronomists* as well as *engineers*, it may be advantageous also to entrust to this Branch, the responsibility for popularising improved implements and agricultural machinery. As mentioned above, this branch should be headed by a Joint Director for Land Development. We have considered the question of constituting a separate Department of Land Development, but we feel that this arrangement will not be conducive to quick and better results. Pending the creation of the Land Development Wing, it will be desirable to transfer the responsibility for the execution of minor irrigation programme from the shoulders of the District Agricultural staff to those of the Engineering staff who are especially meant for this type of work. In some States, the District Agricultural Officers and those below them are kept so busy with minor irrigation programmes that they have little time left for their legitimate educational work.

Headquarters organisation of the Director of Agriculture.

9.6 At the headquarters of the Director of Agriculture, we visualise Joint Directors for looking after, (i) Land Development & Works, (ii) Extension and (iii) Research and Education. In the larger States, where research

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and educational activities have already extended it might be necessary to provide a Deputy to the Joint Director for both Research and Education. In this arrangement there will be no risk of one of the branches lagging behind. With separate Joint Directors, one for Education and one for Research, the psychological barrier that exists at present between persons engaged in teaching and in research will become stronger. The teaching in such a case is likely to become more and more theoretical. If teaching and research are satisfactorily integrated by the Sectional heads of each subject being made responsible for both the disciplines, then there would be no danger of either of them lagging behind because of the other. With the development of post-graduate teaching, the integration of teaching and research will become all the more necessary. A very large number of Seeds Farms have already been opened and some of them are still being started. All these Seed Farms together with other farms which the State might have, would require expert knowledge and guidance of an officer who will be a Deputy to the Joint Director for Extension. He should be fully responsible for the running of all the farms in the State and should operate on the budget of these institutions which should be centralised, wherever found necessary. All the officers at the headquarters should be enabled to tour regularly and inspect the institutions under them thoroughly and guide them technically.

9.7 The Joint Directors of Extension should be supported by at least four Extension Specialists in Agronomy, Plant Protection, Soils ~~and Soil fertility~~, Horticulture and any other subject depending upon local conditions. It will be the duty of these Extension Specialists to formulate Statewise plans for the extension of research findings and to remove technical difficulties encountered in their extension. These Specialists should be drawn from the Research Sections and should work in close liaison with the Research Officers, so that the translation of results of research into field practices is not delayed. These Extension Specialists who are the subject-matter specialists, with training in extension methods will constitute a Farm Advisory Service, which would keep in close touch with agricultural research being done at the Central, State and Commodity Committee research stations and formulate authoritative recommendations on farm practices and techniques of production for use by the agricultural extension officials of Blocks. They will also help in planning and organising crop campaigns. The training of young officers should be an important assignment for all the Joint Directors.

9.8 In some of the States there are special posts of Development Officers for crops, such as, Sugarcane Development Officer, Cotton Development Officer, Oilseeds Development Officer, Jute Development Officer etc. These officers may work as Deputies of the Extension specialist in Agronomy and the appointment of such Deputies will be justified only when a particular crop deserves special consideration in a State.

9.9 There should be an Administrative Officer subordinate to the Director of Agriculture at his headquarters to relieve him of routine administration. The Administrative Officer should deal with all establishment cases and should be drawn from the State Civil Service. In addition, there should be a Budget and Accounts Officer drawn from the State Finance and Accounts Service for relieving the Director of Agriculture from routine accounts matters. This Officer will carry the entire responsibility in the sphere of budget and accounts. In smaller States, these posts could be combined and held by one officer, instead of the two suggested.

9.10 The State Departments also need at their headquarters a full time Progress and Evaluation Officer, assisted by a small unit of staff, who should be responsible for the collection of development statistics on one side, and the evaluation of programmes on the other. He should keep the departmental programmes under continuous review and measure their success or otherwise in the field, so that any defects of execution or planning could be rectified immediately. Some States have a senior Statistician attached to the Headquarters of the Director of Agriculture. Wherever such posts exist, the progress and Evaluation Officer could also be placed under him. This unit is intended to function as the eyes and ears of the Department with respect to all technical programmes undertaken in the field.

Organisation at District level.

9.11 The Extension Specialists at the headquarters of the Director of Agriculture should be supported by similar specialists at the district level. In some of the States where the extension programme is not well developed, or where the districts are very small, it might even be advantageous to have these specialists for a group of districts. In this connection it may be pointed out that extension programmes for sugarcane and cotton are better developed in most of the States than similar programmes for foodgrain crops. For developing the programmes on foodgrains, oilseeds, and pulses it might be worthwhile to appoint Special Extension Specialists at the District and State level. The appointment of such Specialists will exert pressure both on the research staff as well as on the farmers.

9.12 The provision of additional four subject-matter specialists in agriculture at the Block level as visualised in the Report of the Agricultural Personnel Committee will be the third stage of development and this will naturally be reached earlier in some States than in others.

9.13 Even after the supply functions have been transferred from the District Agricultural Officer to other appropriate agencies, such as Co-operative, the work load will be fairly heavy in those districts where there

will be ultimately more than 12 to 15 Blocks; as we visualise that it should be possible for a District Agricultural Officer to visit a block, at least, once in three months and devote 3 to 4 days in each Block. In some States, additional District Agricultural Officers are being appointed for this purpose and the districts are being bifurcated; whereas, in some other States, a Personal Assistant is being provided. There are still other States where Sub-Divisional Agricultural Officers have been provided to be incharge of each Revenue Sub-Division of a District. We regard this as a better arrangement, as a limited number of experienced officers can serve as District Agricultural Officers; while a number of younger and enthusiastic officers can work under their guidance as Sub-Divisional Agricultural Officers. Under such an arrangement, one experienced Deputy Director can guide the agricultural work in about 100 to 125 Blocks and 3 to 4 District Agricultural Officers can guide the work of 10 to 12 Sub-divisional Agricultural Officers, each of whom would be looking after about 10 to 12 Blocks. In this case, it will be necessary to have a District Agricultural Officer of the Class I cadre as this officer should combine both technical competence and initiative. The posts of Deputy Directors should be included in the selection grade and should correspond to those of Superintending Engineers.

9.14 Until the supply functions are transferred from the Agricultural Department, it is necessary to provide gazetted Personal Assistants together with necessary accounts and audit staff, both to the District Agricultural Officers and the Deputy Directors of Agriculture, in order to relieve them of routine accounts, bills and supply work. The Personal Assistant should be authorised to sign bills and issue sanctions on behalf of the officer under whom he is working.

Organisation for Agricultural Information.

9.15 The success of agricultural production programmes depends upon among other things, on a suitable Farm Education Service reaching the cultivator and extending to him current knowledge of improved agricultural practices. A Farm Education Service which is intended to educate the farmer in adopting improved techniques of farming has three essential components, viz. (i) Farm Advisory Service, (ii) National Extension Service, and (iii) Agricultural Information Service. The Government of India and the State Governments are developing effectively National Extension Service at the Block and Village levels which will be expanded eventually to cover the entire country. The Village Level Worker is intended primarily to work at the Village level, but he does not possess adequate training in agricultural practices on scientific lines, although a major portion of the farmer's occupation relates to agriculture. He probably knows less about "agri-

culture" than many "good" cultivators. His effectiveness in improving agriculture and his utility to influence farmers will increase if he has a constant supply of good educational material and current scientific information, processed in a manner which could be understood by him, for transmission to the cultivator. We have elsewhere recommended the establishment of a suitable Farm Advisory Service to be developed in each Agricultural Department so that properly trained Extension Specialists in specified subject-matter fields, who will be free from the regulatory and enforcement functions which now form the major portion of the duties of the officers of the State Departments of Agriculture, would form an effective link between the research institutions and the field level extension agency.

9.16 The Farm Advisory Service to be fully effective should be supported by an Agricultural Information Service, consisting of trained staff of Information Officers specialising in mass communication methods. Mass communication is just as specialized field as agricultural research or agricultural Extension. Neither a research worker nor an Extension Specialist could be expected to prepare extension publications, leaflets, pamphlets, charts, exhibits, visual aids which form an important plank in conveying agricultural information to the farmers. While the research workers and the Extension subject-matter specialists of the Farm Advisory Service would provide scientific information, the processing of such scientific material into popular extension publications, visual aids and other information data, will be the special responsibility of the officers of the Agricultural Information Service. Steps have already been initiated during the Second Five Year Plan to develop Agricultural Information Units for this purpose in the State Departments of Agriculture. Similar Information Unit has also been developed in the Extension Wing of Central Ministry of Food & Agriculture with which the State Units will work in close cooperation, but the State Units will have to pay special attention to the production and distribution of information literature in local languages and in filling up gaps in scientific information having a local bias. It is important that agricultural information work should be distinguished from publicity and propaganda work which is the normal function of the Information and Publicity Department of a State. The Committee would accordingly recommend that the Agricultural Information Units in the States should be developed as soon as possible into full-fledged Agricultural Information Bureaus located in the Agricultural Departments principally to deal with scientific information to reach the villager with knowledge of 'how to increase his income'. In any State where agricultural information work is mixed with publicity and propaganda, it should be separated and located in the agricultural department to be developed into an Agricultural Information Bureau to deal with extension type leaflets, pamphlets, journals, visual aids, films, exhibitions and all means of mass

contact with the villager. The work is a specialized one and the presentation of the material in a language and form acceptable to the Indian villager should require more and more recognition. The material produced in this bureau should be extensively supplied to the field extension workers such as the Village Level Workers and also to the farming public. The bureau should be under the charge of an Information Officer equal in rank to the Head of a Section. He should be adequately provided with staff, equipment and funds to effectively carry out his work.

CHAPTER X

ORGANISATION FOR AGRICULTURAL RESEARCH AND EDUCATION

Not enough Research.

10.1 For increasing agricultural production in our country substantially, we have to rely more and more on improving the efficiency of production by evolving scientific methods and applying them to agriculture. The intensification of agriculture will, in its turn, create additional demands on research as has been seen in other countries. On account of these reasons we agree with the observations made by the Joint Indo-American Team on Agricultural Research and Education that, "the total research programme under way is inadequate to meet the needs and demands for improved agricultural materials and practices on Indian farms". Research is the basis of all agricultural progress. However efficient the organisation for extension may be, unless it is based on the solid foundations of research, it would be like a house built on sand. It has been aptly remarked, "without adequate research, extension would be like an empty pipe-line, costly alike to the people who paid for it and to the Government that built it."

Regional Research Stations.

10.2 There is a clear necessity for establishing major research stations for serving the needs of each agro-climatic region and tract having a particular type of soil and climate. This will mean the establishment of at least 50 major research stations, equipped and staffed for undertaking research work in all branches of agricultural improvement. Each of the stations may have three to four plant breeders and one or two workers in the field of soil science, entomology, mycology and two or three in the field of agronomy and horticulture. District farms and sub-stations, and crop and irrigation research stations within the region would serve as sub-stations of the regional research station and they should be properly manned and equipped for carrying out extensive testing of varieties, manures, cultural practices and plant protection and farm management practices.

10.3 We visualise ultimately, that around these major research stations, agricultural institutions like Agriculture and Veterinary Colleges and train-

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ing centres may be built up. Subject-matter specialists, where they are intended to serve a region, may be posted at the appropriate Regional Research Station; and those posted in the Districts should frequently visit the Regional Research Stations. In each State, therefore, there may be there to five or even more such research stations. It is necessary to ensure that the expenditure incurred on research on various crops bears some relation to the area of the crop in the region and the income therefrom. These Regional Research Stations which are intended to serve the needs of the area, fill the gaps in research in two directions, with respect to the region, as well as the crops. We understand that an exhaustive study has been made recently by Dr. K. Ramiah under the auspices of the I.C.A.R., of the present position of rice research and rice development in some States where rice is an important crop. We are in general agreement with the recommendations made by Dr. Ramiah in the case of rice and suggest that if similar reviews could be carried out by experts in the case of other important crops, some of existing lacunae in crop research and its application to field could be filled up.

Agricultural Colleges.

10.4 At least one of these Regional Stations should develop into a first rate Post-graduate Training centre. Where the Regional Research Station and the Agricultural College are located at one and the same place, it is desirable to have a single officer to head both these institutions. This Officer- the Principal or the Dean- should have two Deputies, one for education and the other for research, so that both the branches receive adequate attention. The college must remain in constant and vital touch with the farmers and their organisations and should develop a tripartite organisation for research, education of students and extension or education of those who cannot come to the college. Agricultural Colleges in States should unify these functions into a comprehensive scheme without which the college cannot work as a leader in solving rural problems. In some States, considerable success has been achieved in this direction, but in others the organisation needs overhauling. To make teaching and research more practical, and ensure a free flow of agricultural problems and results of research back and forth between the village and the research laboratories and farms, the teacher, research worker and the Extension Specialist should be teamed together and placed under the technical and administrative control of one and the same officer in each major field of agricultural science.

Establishment of Agricultural Extension Sections.

10.5 The weakest link in agricultural research and educational

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organisation is extension due largely to the total separation of the extension wing from the research wing. We recommend the setting up of an Extension Section in the agricultural colleges under a Professor of Extension whose function will be to teach extension methods to the students, so that when they pass out, they can prove effective extension workers. On the research side, his duties will be to develop appropriate extension techniques to suit various situations and to organise research in extension methods in collaboration with other research workers of the college.

Extension Specialists at Regional Research Centres.

10.6 In order to feed the research worker with the problems of the cultivator and to test the findings of research in the cultivator's fields, under his conditions, it is necessary to attach Extension Specialists at the main (regional) centres of research, preferably, where agricultural colleges house the staff actively engaged in research. The association of extension specialists, besides helping to make the research programme more realistic, helps the teachers to make their teaching more practical than what it is at present.

Separate Section of Agricultural Economics.

10.7 It is urgently necessary to organise in the Agricultural Colleges and Research Institutions, a separate section for carrying on teaching and research work in the field of Agricultural Economics. The absence of training facilities in these two subjects namely, Agricultural Economics and Agricultural Extension, that is commonly met with in a number of Colleges needs to be corrected immediately. There are States where teaching sections deal with Agricultural Extension and Agricultural Economics but they do not carry out any field research. If teaching has to be related to field needs, it is necessary that such sections must be enabled to carry out research in the field.

Vocational School for Agriculture in each district.

10.8 There should be one Vocational School of Agriculture in each district. These schools should concentrate largely on practical training and should be adequately equipped with farm and other training facilities. These schools may run two or three different types of courses. There should be a regular Two Years' Course in Agriculture for those who have passed the Secondary Examination. This course should qualify them for lower posts in Cooperative, Agriculture and Revenue Departments, where personnel of the calibre of Intermediate is required and preference should be given to such personnel. Concrete steps should be taken to enable those who have

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passed at least Matriculation and have put in two years at the Agricultural School to secure admission to an Agricultural College and complete the course in a shorter period than what is normally required.

10.9 A separate hostel should be provided at these schools for the farmers to reside during their period of training. It is intended that specific short courses ranging from two to ten weeks, may be organised for the benefit of practical farmers. Such courses should cover growing of special crops, poultry keeping, bee-keeping, horticulture, farm management, agricultural, machinery etc. depending upon the local demand.

10.10 These schools should be in the immediate charge of the Regional Deputy Directors of Extension, but under the general control of the Dean or Principal of the College located in the region. The problem of integrating the schools with college teaching, to enable outstanding boys from schools to go up for college education will have to be handled by the Dean, who as a member of the various bodies of the Board of Secondary Education and/or the University will be in a better position to frame proposals on the changes necessary from time to time in the syllabus.

Closer Coordination between research, education and extension branches.

10.11 For bringing about a close coordination between Research, Education and Extension Branches, arrangements should exist for holding annual if not half yearly conferences at the major research stations, which will be attended by all officers connected with Research and Extension and who are working in the region. Where the number of attending officers is large, it might be advantageous to hold this conference twice or three times in the year with a common agenda, but with rotational attendance. During this five to six day's conference, the needs of the area in the three branches of Research, Extension and Education should be considered along with the progress made and new proposals prepared in the light of recent advances. A couple of days should be ear-marked for learning new techniques and for discussing specific problems with the different specialists. A similar meeting at the District level may be held for a day or two, once in three or four months.

Research workers to be given relief from administrative and accounts work.

10.12 It has been observed that in research institutions, including experimental stations and research farms, the rules have become masters instead of being guides. Consequently, most of the workers engaged in colleges or in research are burdened with administrative and routine account-

ing duties to the detriment of their normal research or teaching functions. The Principal of an Agricultural College in the country has to put nearly a thousand signatures to such papers and is tied down in his office chair for nearly 4-5 hours every day. These officers who are not trained in accounts or administrative matters are naturally apprehensive of such work and they have to waste a lot of their time in matters not connected with their technical qualifications. It is imperative that in all agricultural institutions, which handle an annual expenditure of say, a few lakh of rupees, there should be properly trained administrative and accounts staff of appropriate status located so that they take full responsibility for such accounts work and do not commit the research staff in any way to assume responsibility for such work.

Utilisation of retired specialists.

10.13 A number of subject-matter specialists have retired and settled down in different parts of the country. As senior research specialists usually work at headquarters, sometimes, they are not in day-to-day touch with the working of the research schemes which are executed by research institutions far away from the headquarters. In such cases it would be advantageous if retired specialists are given facilities to visit the research institutions for giving guidance to the research officers and give a critical review of the work done, so that senior specialists could remedy defects in time. Retired specialists could also be associated with the supervision of local schemes. They could be given some honorarium to compensate them for their out of pocket expenses. An arrangement of this nature, whereby the talents of experienced and retired specialists are utilised profitably either in research institutions or schemes operating in the field, would be highly desirable.

10.14 In conclusion, it may be emphasised that with the expanded scope and nature of responsibilities, the Departments need clear sense of purpose, an adequate set up, competently manned, well defined duties for each rank, adequate inspection and supervision at all levels and a sense of urgency. Special effort have to be made for developing a new outlook, where the minds of officials are attuned to the needs of the day and the interests of the cultivator, and the willingness to work in a team, born out of the understanding of the problems facing the country which brook no delay.

SUMMARY OF RECOMMENDATIONS

Growth of Agricultural Departments and the Prevailing Service Conditions.

1. The growing tendency of depending upon stimulus from the Centre for taking action on subjects which are the responsibility of the States, needs to be discouraged. States should examine periodically, the structure, objectives and policies of the State Department of Agriculture with a view to providing balanced growth and enunciating programmes and policies. This review should be undertaken once in five years by a special Committee of agricultural scientists, administrators and progressive farmers. (2.3 & 2.4)
2. A similar Committee is recommended at the Centre for examining programmes and policies of the Central Commodity Committees and other Central Institutions dealing with agriculture. (2.5)
3. The Royal Commission on Agriculture made important recommendations in 1928 with regard to improving service conditions, but unfortunately most of these recommendations have not been implemented. Present day problems of low morale and inefficiency are attributable to non-implementation of these vital recommendations made thirty years ago. (2.8 to 2.17)
4. A very large number of temporary posts—30% to 80%, still exist in State Departments of Agriculture. All temporary posts continuing for more than three years and having reasonable chances of continuing should be added to the State cadre and made permanent. Pensionary and other rights such as annual increments etc. of agricultural workers who have served for many years should be protected. (2.19)
5. Willingness to recognise the Agriculture Department as a major and important department is still lacking and there is a strong need for planning and distribution of national intellect. (2.15 & 2.20)
6. Low scales of pay do not attract talent. To attract the best talent available in the country to the field of agriculture, they should be paid at par with the administrative services. The existing disparity has lowered the stature of agricultural services in this country. (2.21 to 2.23)
7. The scales of pay of gazetted, as well as, subordinate agricultural services should not be lower than those for other services, requiring compar-

able training and subsequent prospects of promotion and prosperity in the service. (2.24)

8. The District Agricultural Officers and the Regional Deputy Directors who play the role of an adviser, should be up-graded in status. Avenues for promotion should be increased by introducing more senior and selection grade posts. (2.25 to 2.27)

9. If technical qualities and competence are to be promoted, there should be adequate recognition of merit at all stages and advancement should not depend merely on seniority. (2.29)

10. Creation of supernumerary posts in superior cadres is necessary for retaining technical personnel of requisite aptitude and competence in their fields of specialisation, without allowing their prospects of promotion to suffer. (2.30)

11. For raising the morale and prestige of agricultural services and for attracting equally suitable human material and for bringing about uniformity of standard, an All-India Agricultural Service should be created. The scales of pay and prospects should be at par with the I.A.S. (2.34 & 2.35)

12. Till such time that an All India Service can be created, an 'Agricultural' or 'Technical' Cadre or Pool may be created in the I.A.S. cadre to which 33% of the technical officers of State Class II Services and above, should be recruited by the Union Public Service Commission, strictly on the basis of merit and competence. (2.36)

13. State Departments of Agriculture should frame or revise rules for recruitment, confirmation and promotion. An experienced Administrative Officer from the Appointments Department should be deputed with the Secretary, Agriculture for drafting or revising the rules of Agricultural Services. (2.37 & 2.38)

14. Only those persons who have an aptitude for agriculture should be recruited in agricultural departments. Suitable tests for aptitude should be devised, especially for research. (2.39 & 2.40)

15. Qualifications for various posts in the agricultural departments have been suggested. (2.41)

16. In Extension and Farm Management Branches, 40% of the posts should be filled up by direct recruitment; similarly, 50% of the posts of the Deputy Directors should be filled up by direct recruitment so as to attract bright young men in the services, before they have lost their initiative and drive by serving long periods in subordinate positions. The introduction of fresh blood will tend to tone up the services. (2.42)

17. Suggestions have been made for grouping of posts, promotion quota and qualifications required for various branches of the Agriculture Departments. (2.43 to 2.45)

18. The posts of Principal of Agricultural College and Joint Directors of Agriculture, Research, Education and Extension etc. should be treated as selection grade posts and should not be filled merely on the basis of seniority. In filling these posts, as well as those of Deputy Directors and Heads of Sections the need for recruiting officers with merit, initiative and drive is paramount. (2.45)

Training And Assessment.

1. The fast disappearing concept of taking training of subordinates as an important duty needs to be restored. (3.1)

2. Fresh agricultural graduates recruited by the Agricultural Departments should be given orientation as well as 'on the job' training. Old staff, whether engaged in research, teaching or extension or when transferred from one agro-climatic zone to another should also receive this training. (3.2)

3. It is important that training courses are conducted by senior, experienced and competent officers. (3.2)

4. Job training should impart a practical working knowledge of different types of jobs to be entrusted to the trainees. It is necessary that a systematic and regular programme of training is drawn up and the officers expected to fill higher posts given such training. (3.3)

5. In order to keep agricultural officers abreast of latest developments and researches, arrangements should be made permanently for imparting refresher courses in a systematic and automatic manner. These refresher courses should be followed by examinations and those who fail to pass in these examinations should stand to lose; those who pass should stand to gain in matter of promotions. (3.4 to 3.7)

6. Short-term intensive courses should also be organised during summer vacations at post-graduate colleges for the benefit of the research, teaching and extension staff. Due weightage should be given to the examinations passed at the time of promotion. (3.8 to 3.10)

7. Special training facilities need to be organised for imparting training in Farm Management and Farm Planning on a few selected farms, as it is only through well managed farms, running at a profit, that modern practices can be demonstrated to the cultivator in a convincing manner. (3.11)

8. The need for foreign training should be assessed on a long term basis and panels of selected candidates should be kept by the State Departments of Agriculture. Ad-hoc selections should be avoided. After receiving training officers should be posted back to the subject of their specialisation. (3.12)

9. In all the cadres of the agricultural departments where there are more than 8 to 10 posts in a subject, a training and deputation reserve should be created. This should be in addition to the normal leave reserve. The need for training is felt more keenly in the case of the extension or the field personnel. (3.13)

10. Periodical examinations should be prescribed for officers. Those who fail to pass should not be confirmed, promoted or permitted to cross the efficiency bar. (3.14)

11. The existing system of evaluating officers leaves much to be desired. For proper assessment of subordinates competent Boards should be set up; gazetted officers should be assessed by Boards of Agricultural scientists and technical men of repute from different parts of India. These reports will enable the Director of Agriculture to assess the work of his departmental officers. (3.15 & 3.16)

*Decrease of the single
vertical approach*

Coordination.

1. Co-ordination of work is a knotty problem and what is urgently required is coordination of mind and action. There is tendency for coordinating bodies to function in a routine manner. These bodies do not meet often enough and follow up action is lacking. For coordination to operate successfully, adequate authority and power should be vested in the coordinating bodies at all levels. For this purpose it is suggested that the Development Commissioner should have a status higher than the Secretary to Departments. (4.2)

2. Field Officers are burdened with too many reports, and returns. Multiplicity of returns does not ensure coordination; what is more important is that coordinating bodies should meet frequently on predetermined dates. (4.3)

3. Research programmes should be examined by working parties, consisting of specialists in concerned subjects and then by a Research Committee consisting of Heads of Research Sections, Professors, Principals and Deputy Directors of Agriculture. For suggesting research problems there should be Regional Advisory Committees, as in some States, consisting of

District Agricultural Officers, leading farmers and selected Extension Officers and Farm Managers. (4.4)

4. There should be a similar Committee at the State level for formulating and coordinating Extension programmes and also Regional Advisory Committees to discuss the district programmes. (4.5)

5. Similarly, Educational programmes should be prepared by the Educational Programme Committee at the State level, with representatives from Research, Education, Extension and the Community Development Departments. Training programmes for Farm Leaders, V.L.W's and farmers drawn up at the divisional level should be considered by this Committee (4.6)

6. There is a gross lack of coordination between Irrigation and Agriculture departments, both in planning and execution. This has resulted in the irrigation resources of the country not being fully utilised. It is suggested that Irrigation Department should have special Agricultural Officers to serve as a liaison between the agriculturists and the State Departments of Agriculture, ensuring maximum utilisation of water. (4.7 & 4.8)

Evaluation And Assessment Of Development Work.

1. For evaluating and assessing progress of works and schemes, a small unit has been suggested at the headquarters of the Director of Agriculture. This unit should conduct every year detailed studies of a few schemes. These studies will help in revising procedures and avoid pitfalls. (5.1)

2. The progress made in extending the recommendations of the Research Sections to field practices, should be evaluated by Heads of Research Sections. (5.2)

3. The feeling that officers have discharged their duties once they have completed the specified work or distributed aids such as seeds, fertilisers, implements etc. should be discouraged. An intensive drive to promote follow-up work should be built up through intensified supervision. (5.3)

4. Inspections and supervision seem to have been relegated to the background and deal more with procedures, accounts and irregularities, rather than with technological standards adopted in Demonstrations, Extension etc. Inspections should be purposeful and pre-planned to provide technical guidance and solutions on the spot. It should also be checked up whether earlier advice and instructions given have been acted upon on correct lines. (5.4 & 5.5)

5. A regular system of oral reports from subordinates is recommended, by which senior officers should remain in continuous touch with the progress

of work. Such opportunities should also be utilised by subordinate officers to discuss with their seniors local problems and thus help to keep the work under continuous review. (5.6)

Programme Planning.

1. It has been noticed that gradually and imperceptibly, the propaganda or the extension branch of State Departments of Agriculture was converted into a machinery for executing land development works and for distributing supplies; the principal task of educating the farmers for adopting new methods of cultivation receded into the background. (6.1 to 6.6)

2. The important role which the Agriculture Departments should play in framing policies which contribute to production has been indicated. The knowledge gained through experiments has not been translated into practical field application. It is essential that a "technological balance" is maintained in planning programmes for different areas. (6.7)

3. Adoption of self help programmes, which benefit the small non-credit worthy farmer is recommended. This constitutes supply of small quantities of nucleus seed to villages and organising the farmers for multiplying the seed and exchanging it locally. This process has the advantage of decentralising the work completely. (6.8)

4. For building up soil fertility, a programme of green manuring in irrigated areas and the production of compost in non-irrigated areas should be adopted. Planting of fuel trees and shrubs, for eliminating the conversion of cow dung into fuel for cooking purposes, has been neglected. These three basic items are capable of universal adoption, leaving the department of agriculture free for carrying out their educational programmes. (6.9)

5. Cultivators should be persuaded and helped to own their equipment, individually or cooperatively, for spraying and dusting their crops against insect pests and diseases. (6.10)

6. The Agricultural Department should evolve plans for increasing agricultural production in every village, rather than for executing the targets for distribution of seeds, fertilizers etc. If integrated plans for increasing the production in a village are prepared and executed, the targets prescribed for the Second Five Year Plan will be taken care of automatically. (6.11)

7. The present system of fixing targets state-wise and then breaking them district, tehsil and village-wise is defective, as resources are locked up in the slow moving areas. The locking up of resources in the slow moving areas should be avoided and initially only 50% to 60% of the resources

should be earmarked for an area for utilisation in 4-6 months; additional amounts being given according to actual performance. (6.11)

Budgetting, Sanctions, Procedures and Delegation of Powers.

1. Means must be devised urgently to avoid concentration of expenditure during the last quarter of the financial year. (7.2)

2. The various stages of action from the formulation of schemes to their implementation should be completed more expeditiously and unnecessary references to the Centre and State Finance Departments should be eliminated. Personal discussions among officers should be encouraged. (7.5)

3. Plan Schemes should be taken up immediately on the advent of the financial year and no administrative or financial delays should be allowed to stand in the way of execution. (7.5)

4. The technical and financial scrutiny of schemes should be completed before the financial provision is made in the budget. The schemes should be prepared initially in greater detail and the financial authorities should issue standing instructions indicating the minimum data to be furnished in respect of each scheme. (7.5)

5. A lump sum provision may be made in respect of schemes for which complete and detailed examination cannot be made due to lack of technical data, expenditure sanctions being issued after detailed scrutiny. In respect of schemes spread over a number of years, the issue of administrative and expenditure sanctions during the second and the succeeding years should be regarded as a formality only. (7.6)

6. Once schemes have been included in the budget after proper scrutiny, a second reference to the Finance Department for expenditure sanction before their implementation should not be necessary. (7.7)

7. In the case of Union Territories, after the budgets are voted, sanction for the implementation of schemes has to be given by the Administration concerned through the Home Ministry who again refer to the Administrative Ministries and Finance. This second reference to the Government of India should be dispensed with. (7.13)

8. Organisational improvements such as the posting of an Internal Financial Adviser with powers to take decisions in the State Departments of Agriculture should be undertaken. The officers of the Finance Department responsible for scrutiny and sanction of the schemes should preferably,

have actual experience of formulation and implementation of plan schemes. (7.14)

9. In case a scheme has been sanctioned as a whole, there should be no need to obtain separate sanction of the various component parts of the scheme such as staff, equipment, etc. (7.15)

10. There should be the greatest delegation of powers at all levels from the Director of Agriculture downwards. The powers that could be exercised only by the senior officers should be specified clearly and in respect of matters not so specified, the officer implementing a scheme should be free to operate on his own. The financial powers of officers at all levels should be examined urgently and wherever necessary, revised, keeping in view the general rise in cost of services and commodities and the changing needs of the expanded development programme. Suggestions have been made by the Committee for financial and administrative powers which may be delegated to officers at various levels in the State Agriculture Departments. Steps should be taken to codify all financial and administrative powers delegated. (7.16 to 7.20)

11. Officers taking initiative and responsibility should feel that Government trusts them in the exercise of their powers and the delegation of powers should be both in letter and in spirit. Executive instructions which circumscribe normal financial and administrative powers of officers should be issued only after due consideration and for very weighty reasons. A review of all such instructions should be made every six months preferably, by a Committee appointed by the State Governments, with a view to removing them or making them part of the permanent rules where considered absolutely necessary. Temporary restrictions should not be allowed to remain in force for more than six months. (7.21)

12. Each officer should be given as an ad-hoc measure, powers to execute specified schemes for which budget provision has been made even though the expenditure on a particular item may exceed his normal financial powers. (7.22)

13. Indenting departments should be authorised to purchase direct, instead of through the State's Purchasing Organisations, technical stores and stores of petty value, after observing codal formalities. (7.23)

14. Discretionary powers should be given to officers-in-charge of State Transport vehicles engaged on essential food production work to get emergency repair done outside the Departmental workshops, where the interest of the public service justifies it. (7.24)

Supply Procedures.

1. It is generally felt in the States that not only sufficient fertilisers are not being allotted by the Government of India, but the fertilisers allocated from Sindri and other factories are not received by them regularly and in time for application to the crops. (8.4)

2. To overcome difficulties and delays in procurement and supply of chemical fertilisers, it is suggested that proper advance planning should be taken up by the Ministry of Food & Agriculture in consultation with the State Governments. (8.5)

3. Centrally administered godowns, conveniently situated in several parts of the country should be started to receive and store fertilisers for supply to the consuming centres. (8.6)

4. The payment of interest charges to Government of India on short term loans advanced to the States for fertilisers may be deferred till such time as the fertiliser is actually required for use on the land. (8.6)

5. Adequate storage facilities for stocking fertilisers are also not available in the States and the number of distributing centres is not sufficient to meet the requirements. (8.8)

6. Agricultural Departments should confine their attention only to propagation of improved pedigree seeds. (8.9)

7. The quota of iron and steel for agricultural purposes should be increased substantially according to demand made by the States and placed at the disposal of the State Agricultural Departments, who should organise the manufacture of improved agricultural implements for supply ultimately to the cultivators through the Cooperative organisations. (8.11)

8. The entire organisation for the supply of fertilisers, improved seeds, insecticides, agricultural implements etc. should be separated from the extension and technical functions of the Agricultural Departments and transferred to the Cooperative Organisations. These agencies may be helped financially in the initial stages, if necessary. (8.14)

9. The present system of providing credit does not fulfil the needs of the non-credit worthy cultivators. Government policies should be moulded to the needs of the small cultivators and credit facilities extended to them despite the greater risk involved. (8.15)

Model Agricultural Organisation to suit Present Needs.

1. In order to fulfil the expectations of the people in the field of agri-

culture, State Departments should be organised to handle the growing demands of the farmers in an efficient manner. Among other things, the Department should provide facilities for educating and training the farmers, demonstrate better methods of cultivation and disseminate knowledge through audio-visual channels, organise farmers for adopting improved techniques of production and for working together, pick up problems of the farmers and pass them for solution to the research sections and transmit their solutions back to the farmers. (9.1)

2. Agricultural Extension agency should concentrate entirely on educating and organising the farmers to produce more. The Departments of Agriculture should deal with technical knowledge rather than trade in supplies. (9.1)

3. It is suggested that in States, the feasibility of the portfolio of Agriculture and Irrigation being held by one Minister should be considered. This will ensure rapid progress. There may be two Secretaries under the Minister for Agriculture; one for Agriculture dealing with Agriculture, Land Reclamation, Soil Conservation (in agricultural lands), Animal Husbandry and Veterinary Science and the other for Irrigation, Forests (including soil conservation in forest areas), Cooperation and Agricultural Marketing. (9.2)

4. Frequent changes in Ministers and Secretaries should be avoided, as these dislocate the execution of work. (9.2)

5. It is suggested that Minor Irrigation Works, costing not more than Rs. 10,000 should be handled by the Community Development agency; works costing above Rs. 10,000 but not more than Rs. 80,000 may be handled by the Agricultural department and those costing even more may be handled by the Irrigation Department. (9.3)

6. It is recommended that a Works Division be set up within the Directorate of Agriculture under a Joint Director of Land Development with full powers of a Superintending Engineer. This will ensure speedy implementation of minor irrigation and building programmes within the Agriculture sector. A Research Division for agricultural implements and machinery should also be added to this circle. (9.4)

7. Soil Conservation of agricultural lands should be the function of the Agriculture Department and in forest areas of the Forest Department and no independent Soil Conservation Department should be allowed to spring up. (9.5)

8. A separate Land Development Wing is also required in the Department of Agriculture to look after land reclamation, minor irrigation, flood control, soil conservation and drainage. As already mentioned, this Wing

should be under the charge of the Joint Director for Land Development, and should also deal with agricultural machinery and implements. (9.5)

9. The Director of Agriculture should be further assisted by Joint Directors in charge of Extension, and Research and Education. A Deputy Director may be necessary to help the Joint Director of Research and Education depending upon the volume of work. (9.6)

10. There should be a Deputy Director (Farm Management) under the Joint Director for Extension who should be fully responsible for running all the Agricultural Farms, including a large number of Seed Farms established recently. (9.6)

11. The Joint Director of Extension should be assisted by, at least, four Extension Subject Matter Specialists in Agronomy, Plant Protection, Soils and Soil Fertility, and Horticulture and any other subject depending upon local conditions. (9.7)

12. At the headquarters of the Director of Agriculture and subordinate to him, there should be an Administrative Officer and a Budget and Accounts Officer to relieve the executive officers from routine administrative and accounts matters. Smaller States may combine the two posts and have one administrative and accounts officer. (9.9)

13. There should be a Progress and Evaluation Officer, assisted by a small unit of staff for the continuous evaluation of programmes and collection of development statistics. This unit is intended to function as the eyes and ears of the State Department of Agriculture with respect to all schemes. (9.10)

14. The Extension Specialists at the headquarters of the Director of Agriculture should be assisted by similar Specialists at the District level and ultimately at the Block level also. These Extension Specialists should belong to the research sections. (9.11 & 9.12)

15. The work load in districts where there would be more than 12-15 blocks justifies the appointment of Sub-Divisional Agricultural Officers. An experienced Deputy Director can guide work in 100-125 Blocks, while a District Agricultural Officer of 3-4 Sub-Divisional Officers looking after 10-12 Blocks each. In this case the District Agricultural Officer should be in Class I cadre and the Deputy Directors should be included in selection grade corresponding to Superintending Engineers. (9.13)

16. Until the Supply functions are transferred from the Department of Agriculture to other appropriate agencies such as, Cooperative, District Agricultural Officers and the Deputy Directors should be provided with

gazetted Personal Assistants to relieve them of routine accounts, bills and supply work. (9.14)

17. The Farm Advisory Service to be fully effective should be supported by an Agricultural Information Service consisting of trained staff specialising in mass communication methods. It is important that agricultural information work should be distinguished from publicity and propaganda work which is the normal function of the Information and Publicity Department of a State. (9.15 & 9.16)

Organisation for Agricultural Research and Education.

1. The total research programme under way at present is not considered adequate to meet the needs and the demand for improved agricultural materials and practices in the country. (10.1)

2. There is a clear necessity for establishing major Research Stations for serving the needs of each agro-climatic region. These research stations should have a suitable complement of plant breeders, soil scientists, entomologists, mycologists, agronomists and horticulturists. Ultimately, agricultural colleges and training centres should be built up around these major research stations. Subject-matter Specialists working at district stations should frequently visit the regional stations. The expenditure incurred should bear some relation to the area and importance of the crop in the region. (10.2 & 10.3)

3. At least one of the Regional Stations should be developed into a first rate post-graduate training institution, with tripartite organisation for research, education and extension. There should be one Principal or Dean for education and research and two Deputies, one for education and one for research where the regional research station and the agricultural college are both located at one place. (10.4)

4. Agricultural Colleges and Research Institutes should organise two separate sections for research and teaching in the fields of Agricultural Extension and Agricultural Economics. (10.5 to 10.7)

5. Each district should have one Vocational School of Agriculture, imparting practical training in agriculture, extending over a period of two years for those who have passed the Secondary examination. (10.8)

6. Short duration courses and Hostel facilities should be provided for the farmers who come for training in the district schools. These schools should be under the charge of Regional Deputy Directors of Extension but,

under the over-all control of the Dean or Principal of the Agricultural College of the region. (10.9 & 10.10)

7. Close coordination between research, education and extension branches should be maintained through a system of annual conferences held at the major research stations which should be attended by all officers working in the region. Similar meetings should be held at District level once in three or four months. (10.11)

8. To relieve the research staff from administrative and accounts work, there should be properly trained administrative and accounts staff, who should take full responsibility in these matters. (10.12)

9. The talents of retired Specialists who have settled down in different parts of the country should be utilised by associating them with research institutions or with local supervision of schemes. (10.13)

APPENDICES

APPENDIX I

No. 3-35/57-GMF (Co)

Government of India

MINISTRY OF FOOD & AGRICULTURE

(Department of Agriculture)

New Delhi, the 28th February, 1958

From

Shri P.N. Thapar, I.C.S.,
Secretary to the Govt. of India.

To

All the State Governments/Union Territories.

Sir,

I am directed to say that the Conference of State Ministers of Agriculture held in Srinagar in October, 1957, while making a general review of the progress made in agricultural production, observed that serious delays in the execution of several agricultural production schemes in the States are due to administrative complexities and over-centralisation of financial sanctions. The Conference accordingly suggested that the Central Government should set up a Committee consisting of experts and administrators, both from the Central and the State Governments which should visit 4 or 5 States and recommend for the consideration of the State Governments a model agricultural organisation in the States as well as measures for the delegation of powers to agricultural officers at the State, District and Block levels. The Government of India have accepted this recommendation and have decided to constitute a Committee for this purpose.

2. The composition of the Committee is as follows:—

- | | |
|--|--------------|
| (1) Raja Surendra Singh, Adviser, Agricultural Production, Ministry of Food & Agriculture. | ... Chairman |
| (2) Dr. R. J. Kalamkar, Additional Commissioner, Indian Council of Agricultural Research. | ... Member |
| (3) Dr. J.S. Patel, Adviser (Agriculture), Ministry of Community Development, | ... Member |

- (4) Mr. M.L. Wilson, Ford Foundation, New Delhi ... Member
- (5) Shri K. Sachidanandam, Deputy Secretary, ... Member
Department of Expenditure, Ministry of Finance.
- (6) Dr. R.N. Mathur, Deputy Agricultural ... Member-
Commissioner, Department of Agriculture, Secretary
Ministry of Food & Agriculture

3. The Committee will co-opt as additional members, the Secretary to Government in-charge of Agriculture, the Director of Agriculture and the Registrar of Co-operative Societies of the States which they visit in connection with the Committee's work.

4. The terms of reference of the Committee will be:—

- (i) To suggest simplification of administrative and financial procedures in order to expedite the implementation of agricultural production schemes; and
- (ii) To suggest a model agricultural organisation in the States, along with suggestions for delegation of suitable powers at various levels in the States, so that agricultural production schemes may be carried out speedily.

5. The Committee will decide its own working procedure but will visit at least five to six representative States and examine the problem in detail. It is expected to report by September 1958.

6. It is requested that the Committee may kindly be given all the facilities necessary for discharging the duties entrusted to it. The Committee will correspond directly with the State Governments and Central Ministries/Departments for obtaining information/documents and for arranging its tour programmes. All the correspondence meant for the Committee should be sent to the Member-Secretary of the Committee (Dr. R.N. Mathur, Room No. 300A, Second Floor), Multi-storeyed Building, Queen Victoria Road, New Delhi.

Yours faithfully,

Sd/- P.N. Thapar

Secretary to the Govt. of India,

Copy to all Central Ministries/Departments.

Copy to:—

- 1. All Central Ministries and Departments (including Cabinet Secretariat and Prime Minister's Secretariat).

2. }
3. }
4. } Chairman and Members of the Committee as shown in the letter.
5. }
6. }
7. }

8. Directorate of E. & S. (Dr. S.R. Sen) (5 copies)
9. Directorate of Publicity (2 copies)
10. All Officers/Advisers in the Ministry.
11. All Sections in the Ministry.
12. All Attached and Subordinate Offices.
13. G.M.F.(Co) Section (50 copies).
14. Guard File.

By order,
Sd/- K.C. CHETTY
Deputy Secretary.

APPENDIX II

Copy of the D.O. letter No. 23/APA/58 dated 11th, March, 1958 from Raja Surendra Singh, Agricultural Production Adviser, to Shri P.N. Thapar, ICS., Secretary to the Govt. of India, Ministry of Food & Agriculture, Department of Agriculture, New Delhi.

My dear Shri Thapar,

You would be glad to know that the first meeting of the Committee appointed in your letter No. 3-35/37-G.M.F. (Co) dated 28th February, 1958 addressed to all the State Governments was held on 8th March, 1958. We discussed general matters concerning procedure to be followed and chalked out a tentative programme for the Committee. A draft questionnaire to be issued to the State Governments was considered at some length. I hope to finalise the questionnaire in a day or two.

2. There was some discussion on the terms of reference of the Committee and whether the Committee was called upon to also examine the working of Departments allied to Agriculture, e.g., Animal Husbandry & Forests in the States while suggesting model agricultural organisation for them. Considered in the background of the first paragraph of your letter to the State Govts., which refers to delays in the execution of Agricultural Production schemes only, is it to be presumed that an examination of such departments is outside the purview of the Committee.

Copy of the D.O. letter No. 3-35/57-GMF (Co) dated 12th, April, 1958 from Shri Krishan Chand, ICS, Joint Secretary, to Raja Surendra Singh of Nalagarh, Agricultural Production Adviser, Ministry of Food & Agriculture, New Delhi.

Dear Raja Saheb,

Will you kindly refer to your D. O. letter No. 23/APA/58, dated 11th March, 1958, regarding terms of reference of the Nalagarh Committee?

2. I am desired to say that the Committee need not go into the working of Animal Husbandry and Forest Departments of States as this is likely to delay the final report of the Committee since the procedures will require close examination and may differ from those prevailing in the Agriculture Department. Once the report of your Committee is received, an examination could be made if the recommendations in respect of agricultural production programmes could apply also to Animal Husbandry and Forest Departments in matters of delegation of financial and administrative powers.

APPENDIX III

NALAGARH COMMITTEE

MINISTRY OF FOOD AND AGRICULTURE

(*Department Of Agriculture*)

Government Of India

NEW DELHI-2

QUESTIONNAIRE

15th March, 1958

NOTE

Replies may kindly be sent by 14th April, 1958 latest to Dr. R.N. Mathur, Deputy Agricultural Commissioner and Member-Secretary of the Committee, Ministry of Food & Agriculture, Queen Victoria Road, New Delhi-2.

<i>Telegrams :</i>	..	CARE AGRINDIA
<i>Telephone :</i>	...	Office — 46070
		Residence — 33392

QUESTIONNAIRE

1. What are the functions of the State Agriculture Department as a whole, and of the officers and staff employed at different levels in the Department?

2. What is the present set up of the State Agriculture Department with regard to Development, Research and Education and any other activities falling within the jurisdiction of the State Agriculture Department?

3. Is the present set up suited to the present day requirements, especially taking into consideration the targets fixed for the Second Five Year Plan? If not, what improvements would you suggest in the set up.

4. Do you visualise any change in the functions of the State Department of Agriculture? If so, in what manner.

5. What is your conception of an ideal Department of Agriculture, taking into consideration the present day requirements of your State?

6. Is the Head of Department fully effective in the Department under his control? If not, state reasons and what more powers he would need for making himself fully effective?

7. Briefly describe all the agricultural schemes included in the Second Five Year Plan Period giving,

(a) their physical and financial targets and achievements from year to year; and

(b) the targets and actual achievements from year to year in terms of food production wherever such targets have been fixed.

8. In case there is a gap between the targets and achievements in any year, kindly give reasons.

9. Can this gap be ascribed to,

(a) administrative delays and/or complexities;

(b) lack of delegation of administrative or financial powers at any level;

(c) any other reasons.

Kindly give details.

10. Have any bottlenecks been experienced in the implementation of different agricultural production schemes? Kindly give particulars with reference to the agricultural production schemes under the following headings:-

(i) Reclamation of land including eradication of weeds.

- (ii) Soil Conservation Schemes.
- (iii) Minor Irrigation Schemes.
 - (a) construction of wells
 - (b) boring and sinking of tubewells in private lands
 - (c) construction of private irrigation channels and small minor irrigation works
 - (d) installation of persian wheels, pumping sets and other water lifts on private works
 - (e) schemes for construction of State-managed tubewells
 - (f) schemes for the construction of community tanks and other minor irrigation works
 - (g) schemes for the protection of land against flood
 - (h) schemes for drainage of land.
- (iv) Seed Schemes.
 - (a) establishment of seed farms
 - (b) multiplication procedures
 - (c) Seed purchase, storage and distribution procedures.
- (v) Fertiliser Schemes.
 - (a) Procurement and transport of fertilisers
 - (b) Storage and distribution of fertilisers
 - (c) Provision of credit for fertilisers.
- (vi) Organic Manure Schemes.
 - (a) Town compost
 - (b) Village compost including night soil compost scheme for the Panchayats
 - (c) use of green manures including the seeds of green manures.
- (vii) Special Crop Development Schemes.
 - (a) Horticulture Development
 - (b) Cotton Development
 - (c) Oilseeds Development
 - (d) Jute Development
 - (e) Development of other crops.
- (viii) Plant Protection Schemes.
- (ix) Agricultural Implements Schemes—manufacture, purchase, storage and sale of agricultural implements.
- (x) Agricultural Extension Schemes.
 - (a) Demonstrations, demonstration equipment materials etc.
 - (b) Agricultural information materials.
- (xi) Bottlenecks connected with Farm Management.
- (xii) Bottlenecks connected with agricultural research.
- (xiii) Bottlenecks connected with agricultural education.
- (xiv) Any others not covered by above.

11. Is there too much paper work in your opinion? If so, kindly give your suggestions for improving the situation.

12. What are the main reasons for the delay in the execution of schemes in the agriculture sector of your State's Second Plan? Kindly give instances of such delays.

13. What difficulties or delays have the State Governments experienced while referring and obtaining sanction of their schemes to,

(a) the Central Ministry of Food & Agriculture,

(b) the Planning Commission, and

(c) other Ministries or Departments within the State itself.

14. What are the administrative and financial powers of the Head of Department, Regional and Sectional Officers, Principal, District Agricultural Officer, Farm Superintendents etc. in the Agriculture Department?

15. Has the State felt any marked centralisation of administrative and/or financial powers as being responsible for delay in the execution of plan schemes? If so, at what level and, whether the State Government has considered decentralisation of such powers at secretariat, head of department, district and block levels. Please give details.

16. After the passage of the State budget at the commencement of the financial year, do 'spending' departments have to resubmit their schemes for administrative and financial sanction before the actual execution of the schemes can be taken up?

17. Has the State Government formed any Committee of Heads of Departments to meet regularly and discuss the progress of plan schemes and investigate and iron out the causes for delay in execution of such schemes? If so, with what success.

18. Does the State Government have any co-ordinating body to check the progress of plan schemes in the agriculture sector when such schemes are interlinked with schemes outside the sector?

19. What system is followed in the State to check the progress of plan schemes at regular intervals?

20. What State Government Departments, other than those of the agriculture sector, are involved in executing partly or wholly schemes within the agriculture sector? What system is exercised to check the progress of each schemed or works?

21. What steps have the State Government taken to lay proper emphasis on Agricultural programmes in C.P. and N.E.S. areas?

22. What direct responsibility and authority is exercised by the officers of the Agriculture Department of the State over the working of Agricultural programmes in C.D. & N.E.S. areas?

23. Describe the manner in which co-ordination is secured in the working of the Agriculture and Community Development Department at various levels.

24. Have you any suggestions to make with regard to improving this co-ordination at various levels? Will delegation of administrative and/or financial powers help in an effective manner in securing co-ordination and smooth working of the two Departments? If so, how?

25. What steps have the State Government taken to fix agricultural food production targets at District, Tehsil, Block and Village levels?

26. What non-official agencies are at present in existence in your State for assisting in implementation of the Agricultural programme?

27. What functions do they perform and in what manner ?

28. What are the State Government's views on the usefulness of these bodies ? How can they be made more effective?

29. Is there any co-ordinating machinery between Agriculture and Consolidation Departments of your State? How are priorities fixed in the matter of selection of areas for consolidation of holdings and other related matters?

30. Has the State Government taken any steps to extend Rural Credit facilities to cultivators who individually are not in a position to offer the necessary security for the grant of loan? If so, how?

31. (i) It is sometimes alleged that the demand for loan from cultivators is not met fully or partially and a large majority of cultivators cannot obtain loans. How far is this justified?

(ii) Have any measures been adopted to remedy the situation?

(iii) What steps should be taken to liberalise the existing system?

32. Please describe briefly the legislation introduced in the State during the last five years for assisting food production.

33. Do you consider any further legislation desirable or necessary for increasing food production in your State?

34. What percentage of the staff employed in the agriculture sector is serving on a temporary basis?

35. (i) How do the pay scales of your Agriculture Department employees compare with parallel appointments in other departments?

(ii) Do the existing scales of pay in the Agriculture Department militate against your getting suitable staff? If so, in what manner?

36. For recruitment of field workers does the State Government make it necessary for the candidate to have an agricultural background?

37. Among how many Ministers and Secretaries are your State Departments of Agriculture, Animal Husbandry, Cooperation, Forests, Fisheries, C.P. & N.E.S. divided? Has the State Government ever considered a proposal to group these allied Departments under one Secretary and one Minister?

38. Has the problem of absence of or lack of delegation of powers of administrative and financial nature been examined previously by any Committee in your State? If so, a copy of their report may be forwarded.

39. Have any of their recommendations been implemented so far? If so, give details as far as (a) Agriculture Department (b) other Development Departments are concerned.

40. Are the responsibilities attached to different category of posts in the Agriculture and Community Development Department been clearly defined with respect to the schemes now in operation? If so, details may be given with respect to each category of posts.

41. How far has the absence or lack of delegation of powers stood in the discharge of these responsibilities? Can you suggest any improvements?

42. If further powers are delegated, do you think any addition can also be made to the responsibilities of the staff employed at different levels, which may lead to the speeding of the work or increasing the targets? Your suggestion may please be made with respect to all the agricultural schemes.

43. Enumerate the measures which should be adopted in your State for increasing production of food crops, giving the present yield and the additional yield possible under field conditions by the adoption of the measures suggested.

44. How far have these measures been adopted in the State? Give a comparative statement of the annual expenditure incurred at present on these measures. If more finances are available, what are your suggestions for increasing yield of crops through the application of one or more of the measures suggested by you?

45. Do you consider that any change of emphasis is warranted within the agricultural production schemes now adopted in your State? If so, in what manner.

46. Have any special measures been taken to ensure progress in such areas of the State where concentration of effort is possible, such as areas where irrigation facilities exist ?

APPENDIX IV

Number of posts in different categories in some selected State Departments of Agriculture showing the proportion of Temporary Posts.

State	Selection grade posts.		Class I Posts		II Posts	
	Total No. of posts.	% of temporary posts.	Total No. of posts.	% of temporary posts.	Total No. of posts.	% of temporary posts.
1. Andhra Pradesh	5	67	27	37	190	66
2. Assam	5	40	21	47	70	54
3. Bihar	10	50	63	41	230 (Senior)	56
4. Bombay	Nil		64	51	325	72
5. Kerala	Nil		7	86	13	100
6. Madhya Pradesh	1	Nil	49	27	177	46
7. Orissa	Nil		17	29	87	69
8. Punjab	2	100	27	33	94	56
9. U. P.	Nil		40	17	189	49
10. West Bengal	Nil		23	18	71	41

APPENDIX V

Statement showing disparity in pay scales of officers of Agriculture Departments in different States as compared to their counterparts in other Departments.

<i>Designation of post</i>	<i>Range in pay scales</i>	
	<i>Minimum</i>	<i>Maximum</i>
	Rs.	Rs.
A. State level.		
1. Director of Agriculture	600—900 (Kerala)	1800—2000 (Bombay)
2. Chief Engineer (Irrigation)	1200—1500 (Assam)	2000—2250 (Punjab)
3. Director of Health Services	1000—1500 (Assam)	1300—2000 (Bihar)
4. Commissioner of Division	2250 (All States)	
5. Deputy Commissioner	800—1800 (All States)	
B. Regional level.		
1. Deputy Director of Agriculture	250—750 (Assam)	500—1200 (U. P.)
2. Superintending Engineer	800—1150 (Assam)	1500—1750 (Punjab)
3. Executive Engineer	600—900 (Assam)	625—1275 (Punjab)
4. Deputy Director of Public Instruction	350—1000 (Bihar)	800—1150 (Assam)
5. Deputy Director of Health	350—1000 (Bihar)	350—1200 (Punjab)
6. Deputy Conservator of Forest	350—1100 (Bombay)	1000—1600 (Bihar)
C. District level.		
1. District Agricultural Officer	200—500 (Assam)	250—850 (U. P.)
2. Assistant Engineer	225—600 (Assam)	300—850 (U. P.)

3. Inspector of Schools	250—750 (Punjab)	350—1100 (Bombay)
4. District Health Officer	250—600 (Assam)	350—850 (Bihar)
5. Assistant Conservator of Forest	250—750 (Assam)	350—1000 (Bihar)
6. Deputy Collectors	220—800 (Bihar)	300—700 (Madras)

D. Sub-Divisional level.

1. Agriculture Inspector	80—200 (Bombay)	150—300 (Assam)
2. Assistant Inspector of School	70—200 (Bombay)	200—750 (Bihar)
3. Medical Officer	200—450 (Bihar)	220—650 (Bombay)
4. Mamlatdars; Tahsildar	160—300 (Bihar)	420—500 Selection Grade (Bombay)

APPENDIX VI

Comparative Statement of Pay Scales in Agriculture and other Departments in some selected States.

DESIGNATION.					
	ASSAM	BIHAR	BOMBAY	MADRAS	PUNJAB
	1	2	3	4	5
a) e level.	Rs.	Rs.	Rs.	Rs.	Rs.
1. Director of Agriculture	1000—1500	1300—2000	1800—2000	1200—1400	1700—2000
2. Director of Public Instructions	1000—1500	1300—2000	1300—1600	1500—1800	1800—2000
3. Director of Health Services	1000—1500	1300—2000	1600—1800	1000—1500	—
4. Chief Engineer (Irrigation)	1200—1500	1300—2000	1300—1600	1500—1800	2000—2250
5. Commissioner.	—	2250	2250	2250	2250
6. Dy. Commissioner (Senior IAS Scale)	800—1800	800—1800	800—1800	800—1800	800—1800
(b) Regional level.					
1. Deputy Director of Agriculture	250—750	350—1000	300—1100 (Plus 150 Spl. pay Superin- tending Agricul- ture Officer)	420—750	250—1200
2. Deputy Director Public Instructions	800—1150	350—1000 (Inspector of School)	350—1100	600—1000 (Plus 50 Spl. Pay)	350—1200

3. Deputy Director of Health	*600—1000	350—1000 (Assistant Director)	350—1100 (Assistant Director)	600—1000 (Assistant Director)	350—1200
4. Superintending Engineer	800—1150	1000—1600	1300—1600	—	1500—1750
5. Deputy Conservator of Forest	800—1150	1000—1600	350—1100	1000—1200 (Conservator)	—
(c) District level.					
1. District Agricultural Officer	200—500	200—750	200—650	230—700	250—750
2. Inspector of Schools	250—800	350—1000 (Distt. Educational Officer)	350—1100	300—800 Gr. I (Distt. Educational Officer) 230—500 Gr. II	250—750
3. District Health Officer	250—600	*350—850 (Civil Surgeon)	350—740	—	—
4. Executive Engineer	600—900	600—1150	500—1100	800—1000 (Spl. Gr.) 500—850 (Ordy. Gr.)	625—1275
5. Asstt. Conservator of Forest	250—750	350—1000	220—650	300—700	—
6. Provincial Civil Services Deputy Collectors and Magistrates	—	800—1150 (Selection Grade) 200—800 (Others)	695—875	300—500 (Selection Grade) 300—700 (Others)	300—850
(d) Sub-Divisional level.					
Agricultural Inspector	150—300	125—250	80—200	135—270	100—300

	1	2	3	4	5
2. Assistant Inspector Schools	200—600	200—750	(Agricultural Officer) 70—200	(Demonstrator) 165—245 (Dy. Inspector School)	110—250
3. Medical Officer	—	*200—450 (Asstt. Surgeon)	220—650	—	—
4. Assistant Engineer	200—500	220—750 A. 160—300 B. 210—340	220—650 (Dy. Engineer) (i) Selection Grade 420—20—500	260—500	250—750
5. Sub-Divisional Services Mamlatdars			(ii) First Grade 340—15—400 (iii) Second Grade 250—15—325		

*(Private Practice allowed)

APPENDIX VII

Comparative Statement of Pay Scales in the Departments of Agriculture in some selected States.

	ASSAM	BIHAR	BOMBAY	MADRAS	PUNJAB	U.P.
	1	2	3	4	5	6
A. Headquarters level.						
1. Director of Agriculture	1000-60-1300-EB-50-1500	1300-100-2000	1800-100-2000	1200-100/2-1400 or I.A.S. Grade Pay	1700-100-2000	1500-50-1700
2. Addl. Director of Agriculture	800-50-1000-EB-50-1150	1300-75-1600 (Dir. of Research).	1300-60-1600	1200-100-1400	No Post	1500-50-1700
3. Joint Director of Agriculture	800-50-1000-EB-50-1150	800-50-1000-60-1300-50-1800 (I.A.S. Scale).	—	800-100/2-1000	No Post	—
4. Directors of Extension, Soil Conservation & Education	—	800-35-1150 plus special pay Rs. 200/-	—	—	—	—
B. Regional level.						
1. Superintending Agriculture Officer	—	—	300-350-30-650-EB-45-1100 plus special Pay Rs. 150/-	—	—	—
2. Dy. Director of Agriculture	250-25-400-EB-450-30-600-EB-750 (Promoted officers start at 350/-)	350-25-650-EB-35-1000.	300-350-30-650-EB-45-1100	420-40/2-500-50/2-750	350-40-750-40-950-50-1200 (Selection Grade attached to some posts)	500-50-1000-EB-50-1200 (S.P. Rs. 100/-)

	ASSAM	BIHAR	BOMBAY	MADRAS	PUNJAB	U.P.
	1	2	3	4	5	6
3. Agriculture Engineer	250-25-400-EB- 25-450-30-600- EB-30-750 (Promoted officers start at Rs. 350/-)	350-35-650-EB- 35-1000.	200-220-15-400- EB-20-500-EB- 25-650	420-40/2-500- 50/2-750	250-25-550-25- 750	500-50-1000- EB-50-1200
4. Agrl. Chemists, Econ. Botanist, Entomologist etc.	250-25-400-EB- 25-450-30-600- EB-30-750. (Promoted officers start at Rs. 350/-.)	350-25-650-EB- 35-1000	300-350-30-650- EB-45-1100	420-40/2-500- 50/2-750 (Re-search Officers)	350-40-750-40- 950-50-1200	500-50-1000- EB-50-1200
C. District level.						
1. Distt. Agrl. Officers	200-20-300-25- 400-EB-25-500	220-25-320-EB- 25-670-EB-20- 750	200-220-15-400- EB-20-500-EB- 25-650	230-30/2-260- 40/2-500-50/2- 700	250-25-550/5- 750	250-25-400-EB- 30-700-EB-50- 850
2. Asstt. Chemist, Asstt. Eco. Botanist, Asstt. Director of Agri. etc.	200-20-300-25- 400-EB-25-500	—	—	—	350-25-500-50- 450	250-25-400-EB- 30-700-EB-50- 850
D. Sub-Divisional & Village level.						
1. Agricultural Inspectors	(i) 150-7½-180- 9-270-EB-10- 300. (Agri. Graduate)	125-8-205-EB- 9-250. (For Agri-cultural graduates)	Grade I. 210-10- 300. (Agri. Officer)	No Post	100-10-200-10- 300	120-6-120-10- 250

	(ii) 125-7½-155-9-245-EB-10-275. (Non-Agri. Graduate)	Grade II. 80-5-100-8-140-EB-10-200. (Starting pay Rs. 100. Agri. Officer)				
						75-5-120- (Supervisor)
2. Agricultural Demonstrators	(i) 60-2-80-EB-2½-100. (For trained Demons- trators)	125-8-205-EB-9-250. (For Agricultural graduates)	—	135-5-170-10-270	—	
	(ii) 55-1-65-EB-2½-80. (For un-trained Demonstrators)					
E. Education.						
1. Principal of Agriculture College	500-50/2-600-50-1000	800-35-1150.	300-350-30-650-EB-45-1100. (Special Pay Rs. 100/)	800-100/2-1000	800-50-1300	1050-50-1300 Same for crop Physiologist
2. Vice Principal	250-260-280- (Conf)-20-400-EB-20-600-EB-25-750	350-25-650-EB-35-1000 (Spl. pay Rs. 150/-)	—	420-40/2-500-50/2-750	No Post	—
3. Professor of Agriculture	250-260-280- (Conf)-20-400-EB-20-600-EB-25-750	350-25-650-EB-35-1000	Class I 300-350-30-650-EB-45-1100	600-75/2-900	350-40-750-40-950-50-1200	700-40-900-EB-50-10
			Class II 200-220-15-400-EB-20-500-EB-25-650			

	ASSAM	BIHAR	BOMBAY	MADRAS	PUNJAB	U.P.
	1	2	3	4	5	6
4. Asstt. Professors	—	220-25-320-EB-25-670-EB-20-750	—	420-40/2-500-50/2-750. (Readers)	250-25-550-25-750	—
5. Lecturers	200-225-250-(Conf)-10-300-EB-15-390-EB-15-450	—	200-220-15-400-EB-20-500-EB-25-650 for class II	230-30/2-260-40/2-500-50/2-700	100-10-200-10-300	200-10-310-EB-14-450
			210-10-300 for post in Subordinate Service			

APPENDIX VIII

No. Plan 5/2/57

Government of India

PLANNING COMMISSION

New Delhi, 12th May, 1958.

From

Shri Nawab Singh, ICS.,
Secretary, Planning Commission.

To,

All State Governments.

Subject : Procedure for Central assistance for State Plans and Centrally sponsored schemes during 1958-59.

Sir,

I am directed to enclose a copy of the Ministry of Finance (Department of Economic Affairs) letter No. F 2 (17)-P II/58 dated May 12, 1958 regarding the release of Central assistance for Plan schemes.

2. The Planning Commission proposes that the following procedure be adopted by the various Ministries of the Government of India for the final release of the assistance promised for State Plan schemes executed by the States.

3. Following the discussions relating to the Annual Plan, the Planning Commission has received from the State Governments their proposals for the total outlay and its distribution under the State Plan for 1958-59. The concurrence of the Planning Commission to the proposals of the State Government has already been conveyed except in a few instances, where the Planning Commission has offered comments or suggestions in the light of which the State Government have been requested to finalise their proposals for total outlay and its distribution under different heads. The State Planning Department is requested to furnish to the Planning Commission in the form in Annexure II a list of development schemes to be implemented during 1958-59. This list which should be cleared with the State Finance Department, should reach the Planning Commission by the end of June 1958. Extracts from this list should be sent simultaneously to the Central Ministries concerned to keep them informed of the schemes proposed to be implemented.

4. In the past, Central Ministries have frequently issued specific sanctions to schemes included in State Plans for which Central assistance

was made available. It is proposed that these schemes should be sanctioned by the State Governments under their normal procedure and that no financial sanctions as such should issue from the Centre. In respect of new projects or new categories of schemes (as distinct from continuing schemes), however, the following existing arrangements will continue :-

- (i) In the case of irrigation and power projects, before work is commenced on new projects, they are examined and accepted by the Planning Commission's Advisory Committee on Irrigation and Power Projects;
- (ii) Schemes for industrial housing and slum clearance are reviewed from the technical aspect by the Ministry of Works, Housing & Supply before they are implemented;
- (iii) For certain programmes the Central Government have set up special Boards or other agencies. These are :
 - (a) For different branches of small industry, the Handloom Board, the Small-scale Industries Board, the Handicrafts Boards, the Coir Board, and the Silk Board;
 - (b) For schemes of co operative development other than co-operative farming and cooperative training; the National Cooperative and Warehousing Board; and
 - (c) For technical education; the All-India Council of Technical Education.

The procedures prescribed by these organisations in consultation with the Central Ministries concerned for receiving schemes and giving technical approval to them will not be affected by the terms of this letter except in so far as these relate to the grant of ways and means advances and the final payment sanctions for the year. It may be added that the schemes of the Khadi and Village Industries Commission are altogether outside the purview of this letter.

- (iv) Where, during the Annual Plan discussions, a scheme is included *provisionally* subject to further technical consideration; or a financial allocation is made, leaving the precise scheme to be undertaken to be specified later, it is expected that the scheme will be taken up only after the steps envisaged have been gone through in consultation with the Planning Commission or the Central Ministry concerned as the case may be.

5. With a view to simplifying the procedure relating to Central assistance, it was agreed in the State Finance Ministers' Conference, which was held in November, 1957, that development schemes under each head might be arranged suitably in groups. Annexure I sets out the groups in

which schemes under different heads for which Central assistance has been or may be communicated may be arranged. While the total amount of assistance to be intimated to State Governments is estimated with reference to individual schemes and the patterns of assistance for them, the intention is that once the State Governments have been informed of the amounts of loans and grants available for the State plans, the final sanctions of payments should be related to the groups specified in column 3 of Annexure I. Within a group the State Government will be free to regulate the expenditure on the schemes without reference to the Central Government. Where the total expenditure under one group is proposed to be covered by reduction of expenditure in another group under the same head of development, the concurrence of the Central Ministry concerned should be obtained and the Planning Commission kept informed. Similarly, where the same Central Ministry is concerned with more than one head of development adjustments between them may be made in consultation with the Ministry with advice to the Planning Commission. Where such adjustments are considered necessary as between one Ministry and another, the concurrence of the Planning Commission should be obtained, a copy of the proposal being sent simultaneously to the Ministries concerned.

The final release of funds will be calculated with reference to the proportion of the assistance under loans and grants intimated by the State Government in respect of a group and the total expenditure for the year estimated with reference to that group. Thus, if for a group of schemes the total outlay accepted is Rs. 100 lakhs, of which Central grants amount to Rs. 25 lakhs and Central loans to Rs. 50 lakhs while Rs. 25 lakhs are to be contributed by the State Government, grants and loans will be given at 25% and 50% respectively of the total expenditure as worked out in para 6 below. These payments will be authorised by the Central Ministries concerned by the issue of payment sanctions to the appropriate Accountant General. It is proposed to work out a statement for each State Plan showing the total outlay for groups of schemes as specified in Annexure I along with the total amount by way of loans and grants to be shown against that group.

6. The State Government is requested to forward to the Planning Commission, with extracts to the Central Ministries concerned and copy to the Finance Ministry, Department of Economic Affairs, a quarterly statement giving the total expenditure as recorded in the departmental books under each sub-head indicated in Annexure I. The statements for the two quarters ending June and September may kindly be sent to the Planning Commission by the 15th August and the 15th November, res-

pectively. The statement for the quarter ending December may please be sent by the end of January. This will facilitate the issue of the payment sanctions, although it is appreciated that special arrangements will have to be made by the State Government to obtain the necessary information. The quarterly statements will show both expenditure in the quarter and the cumulative expenditure. The statement for the third quarter will also indicate the anticipated expenditure for the last quarter of the year. This last figure has to be worked out with reference to the progress of expenditure up to December and a realistic estimate of expenditure for the last quarter. On receipt of the statements scheduled for January, the administrative Ministries will sanction the final payments of grants and loans. The Accountant General will clear the ways and means advances given by the Finance Ministry outstanding against the State and credit the difference, if any, in cash to the State Government.

7. As the final payments mentioned in para 5 in each year will be made partly with reference to the estimated expenditure in the last quarter, they will be subject to final adjustment in the following year in the light of the actual expenditure for the year as a whole.

8. The procedure described above applies to State Plan schemes. The only difference in respect of Centrally sponsored schemes is that these schemes require specific approval from the administrative Ministries concerned. It is proposed that in respect of Centrally sponsored schemes which entail a total cost of less than Rs. 25 lakhs over the plan period or of Rs. 10 lakhs during the year, the Central Ministries should accord their approval on the basis of a statement from the administrative Department concerned in the State to the effect that the schemes have been accepted for financial sanction by the State Finance Department. For schemes costing more than the amounts mentioned above, the Central Ministries will intimate their approval after the necessary scrutiny. In either case, it is requested that States will kindly ensure that sufficient information is made available to enable the Ministries to judge that the schemes to be implemented follow the lines approved.

Yours faithfully,

Sd./ Tarlok Singh

for Secretary, Planning Commission

Dated, the 12th May, 1958

No. Plan 5/2/57

Copy forwarded to :

- (1) Finance Secretaries to all State Governments.
- (2) All Ministries of the Government of India.

Sd./ D.K. Malhotra,

for Secretary, Planning Commission.

HEADS OF DEVELOPMENT AND GROUPS IN WHICH SCHEMES ARE ARRANGED

Central Ministry	Head of Development	Groups	Total cost	Central Assistance		Percent- age of 5 to 4	Percent- age of 6 to 4
				Grant	Loan		
I	2	3	4	5	6	7	8
I. Ministry of Food and Agriculture	Agriculture (including minor irrigation and land development)	1. Minor Irrigation including Tube wells.					
		2. Land development and consolidation of holdings.					
		3. Seed farms.					
		4. Supply schemes and plant protection.					
		5. Development of commercial crops, horticulture and fruit preservation.					
		6. Agricultural education.					
		7. Agricultural research, information and statistics.					
	Animal Husbandry, Dairying and Fisheries	1. Animal husbandry, including sheep and wool and poultry development.					
		2. Veterinary education and rinderpest eradication.					
		3. Dairying and milk supply.					
		4. Fisheries.					
	Forests & Soil conservation.	1. Forestry schemes.					
		2. Soil conservation.					
		Cooperation					
II. Ministry of Community Development	N.E.S. & Community Projects	1. Cooperation and warehousing.					
		2. Marketing, cooperative farming and training.					
		1. N.E.S. and Community Projects.					
		2. Village Panchayats.					

III. Ministry of Irrigation & Power	Irrigation & Power	1. Multipurpose projects. 2. Irrigation schemes. 3. Power schemes. 4. Scarcity area schemes. 5. Power facilities for expansion of employment opportunities. 6. Flood Control.					
IV. Ministry of Commerce and Industry	Large and Medium Industries Village and Small Industries	Large and medium Industries. 1. Handloom. 2. Small-scale Industries. 3. Industrial Estates. 4. Handicrafts. 5. Coir. 6. Silk. 7. Conversion of handlooms into power- looms.					
V. Ministry of Steel, Mines and Fuel	Mineral Develop- ment	Mineral Development.					
VI. Ministry of Transport and Communica- tions	Roads Road Transport Minor Ports	1. State Road Programme. 2. Roads of inter-state and economic importance. Road Transport Minor Ports					
VII. Ministry of Education	Education (Other than Technical Edu- cation)	1. Elementary education. 2. Secondary education. 3. University education. 4. Other education schemes. 5. Welfare extension projects and 6. State Social Welfare Schemes.					

IX. Ministry of Health

- Health
1. Water Supply and sanitation-rural/urban.
 2. Education and training.
 3. Control of diseases.
 4. Primary health units and family planning.
 5. Other schemes—Health.
 6. Other schemes—Medical.

X. Ministry of Home Affairs

Welfare of Backward Classes

- (a) Scheduled tribes and Development of Scheduled Areas
1. Education.
 2. Economic Uplift.
 3. Health, housing and other schemes.

(b) Scheduled Castes.

1. Education.
2. Economic Uplift.
3. Health, housing and other schemes.

(c) Ex-Criminal Tribes

1. Education.
2. Other schemes.

(d) Other Backward Classes

1. Education.
2. Other schemes.

Social Welfare

1. Social Defence Programmes.
2. Social and Moral Hygiene and After-care programmes.

1	2	3	4	5	6	7	8
XI. Ministry of Works, Housing Supply	Housing	1. Slum clearance. 2. Subsidised industrial housing scheme. 3. Low-income group housing scheme. 4. Rural housing. 5. Plantation Labour housing scheme.					
XII. Ministry of Finance and Miscellaneous	Local Development Works. Statistic Publicity Other schemes	Local Development Works. Statistical schemes. Publicity. Other schemes.					

ANNEXURE II **LIST OF SCHEMES INCLUDED IN STATE DEVELOPMENT PLAN 1958-59.**

State.....

Head of Development* Group*	Particulars of Schemes	Outlay in 1958-59	Distribution by schemes of loans and grants intimated in Finance Ministry's letter of March 22, 1958				Remarks
			Total	Loans	Grants		
1	2	3	4	5	6	7	8
	1. 2. 3.						
	Total for Group						
	1. 2. 3.						
	Total for Group						
	Total for head of development						

*See Annexure I for details.

No. F. 2(17)-PII/58

Government of India

MINISTRY OF FINANCE

(Department of Economic Affairs)

New Delhi, the 12th May, 1958.

From

Shri M. V. Rangachari,
Special Secretary to the Government of India.

To

All State Governments
(Finance Secretaries).

Subject : Procedure for release of Central Assistance for Plan schemes.

Sir,

I am directed to refer to item IV of the minutes of the Conference of State Finance Ministers held in November, 1957 and to this Ministry's letter No. F. 10(19) PII/57, dated March 22, 1958 in which it was stated that a separate communication would be sent on the subject of the procedure for release of Central assistance funds.

2. Central assistance for Plan schemes comprises :—

- (a) assistance for schemes included in the State Plans ; and
- (b) assistance for Centrally sponsored schemes.

In this Ministry's letter of March 22, 1958, the amounts of loans and grants available for State Plans during 1958-59 have been intimated. A similar statement in respect of loans and grants for Centrally sponsored schemes has been forwarded with this Ministry's letter No. F. 10(19) PII/57, dated April 30, 1958.

3. For the release of Central assistance for Plan schemes in both the categories mentioned above, the following procedure is proposed to be adopted :—

- (i) A substantial portion of the assistance mentioned in para 2 above will be made available to the State Governments as lump sum

ways and means advances by this Ministry. Three-fourths of the total amount will be released in this way in nine equal monthly instalments beginning with May, 1958. Such releases will be made automatically on or about the 15th of the month.

- (ii) On receipt of final sanctions for loans and grants from the Central Ministries in the latter half of February 1959, the Accountant General will clear these outstanding advances. The balance, if any, will be credited to the States by him in cash.
- (iii) The ways and means advances will be interest free but the loans into which they are ultimately or any uncleared balance of such advances outstanding at the end of the year will be deemed to have been made to the State on the 1st October, 1958 and will carry the appropriate rate of interest.
- (iv) The procedure for determining the sums payable as grants and loans is set out in the Planning Commission's letter No. Plan 5/2/57, dated 12th May, 1958 to the State Governments, a copy of which is being endorsed separately.

4. The above procedure will apply to all loans and grants to be given to the State Governments on account of Plan schemes except the loans for the D. V. C., the Hirakud and the Rajasthan Canal, funds for which will continue to be released as at present.

Yours faithfully,

(Sd/-) M. V. RANGACHARI.

Dated, the 12th May, 1958.

No. F. 2(17)-PII/58.

Copy forwarded to :

- (i) All Ministries of the Government of India and all Departments of the Finance Ministry.
- (ii) Comptroller and Auditor General, Accountant General (Central Revenues), all State Accountants General and Comptroller, Kerala.
- (iii) All Heads of Divisions of the Expenditure Department.
- (iv) Planning Commission.
- (v) Development Commissioners of all State Governments.

(Sd/-) M. V. RANGACHARI.

APPENDIX IX

SUGGESTED DELEGATION OF FINANCIAL POWERS

Sl. No.	Nature of powers to be delegated	Director of Agriculture	Jt. or Addl. Director of Agriculture	Dy. Director of Agriculture	Agricultural Engineer	Principal, Agricultural College	District Agricultural Officer	Inspector/Demonstrator
1	2	3	4	5	6	7	8	9
1.	Purchase of books, periodicals, newspapers, maps, etc., for official use.	Full powers	Rs. 1000 a year	Rs. 500 a year	Rs. 100 a year	Full powers	Rs. 100 a year	Rs. 10 a year
2.	To make local purchase of stationery for office in case of urgency.	Rs. 200 a year	Rs. 200 a year	Rs. 100 a year	Rs. 50 a year	Rs. 50 a year	Rs. 30 a year	Rs. 10 a year
3.	To give out urgent printing work to a private press without consulting Superintendent, Printing & Stationery.	Rs. 250 in each case subject to a limit of Rs. 1000 a year.	Rs. 250 in each case subject to a limit of Rs. 1000 a year.	Rs. 100 in each case subject to the limit of Rs. 500 a year.	Rs. 100 in each case with limit of Rs. 250 a year.	Rs. 100 in each case with limit of Rs. 500 a year.	Rs. 50 in each case with limit of Rs. 250 a year.	Nil
4.	To print locally small number of registered forms if supply is delayed.	Full powers	Full powers	Rs. 100 at a time; not more than Rs. 500 a year.	Rs. 100 at a time; not more than Rs. 500 a year.	Nil	Rs. 50 at a time and not more than Rs. 250 a year.	Nil
5.	To hire buildings on lease/rent for use as an office or office-cum-residence.	Rs. 500 per month	Rs. 300 per month	Rs. 200 per month	Nil	Nil	Rs. 50 per month	Nil
6.	To sanction renting of godowns for purposes of seed stores, tractor accessories, etc.	Rs. 200 per month	Rs. 150 per month	Rs. 100 per month	Rs. 50 per month	Nil	Rs. 50 per month	Nil



7.	To sanction extraordinary contingent expenditure even where a reference to Govt. is essential under rules in an emergency.	Rs. 100 in each case.	Rs. 50 in each case.	Rs. 25 in each case.	Rs. 25 in each case.	Rs. 25 in each case.	Rs. 10 in each case.	Nil
8.	To sanction a permanent advance to the head of a subordinate office pending fixation of a suitable amount in consultation with A. G.	Upto Rs. 5000 for a new office.	Upto Rs. 100 for a new office.	Upto Rs. 100 for a new office.	Upto Rs. 100 for a new office.	Upto Rs. 100 for a new office.	Nil	Nil
9.	To sanction to a Govt. servant advances for the purchase of means of conveyance other than a motor car, motor boat or motor cycle.	Full powers	Full powers	Full powers	Full powers	Full powers	Full powers	Nil
10.	To sanction remission and suspension of advances made under Land Improvement Loans Act.	Rs. 1000 in each case.	Rs. 500 in each case.	Rs. 250 in each case.	Nil	Nil	Nil	Nil
11.	To sanction creation of temporary posts.	Upto class II (gazetted) for a period not exceeding one year.	Upto class II (gazetted) for a period not exceeding six months, in case of gazetted posts and one year for other posts.	Non-gazetted posts upto one year.	Non-gazetted posts upto a period not exceeding six months.	Non-gazetted posts upto a period not exceeding one year.	Non-gazetted posts upto a period not exceeding six months.	Nil
12.	To sanction estimates for the execution of works departmentally.	Rs. 50,000 in each case.	Rs. 25,000 in each case.	Nil	Nil	Nil	Nil	Nil

Sl. No.	Nature of powers to be delegated	Director of Agriculture	Jt. or Addl. Director of Agriculture	Dy. Director of Agriculture	Agricultural Engineer	Principal, Agricultural College	District Agricultural Officer	Inspector/ Demonstrator
13.	To authorise commencement of urgent periodical repairs in buildings in anticipation of allotment of funds and sanction of estimates by competent authority.	Rs. 5,000	Rs. 3,000	Rs. 1,000	Rs. 1,000	Rs. 1,000	Rs. 100	Rs. 25
14.	To pass and sanction excess expenditure over the sanctioned estimates on works.	Upto 10% of the original estimates subject to the total cost being within his power.	Upto 10% of the original estimates subject to the total cost being within his power.	Upto 5% of the original estimates subject to the total cost being within his power.	Nil	Nil	Nil	Nil
15.	To modify the details of work under any sub-work or detailed head of account in the case of an estimate sanctioned by Govt.	Full powers	Full powers	Full powers	Full powers	Nil	Nil	Nil
16.	To accept tenders for original and petty works and repairs.	Rs. 1,00,000	Rs. 50,000	Rs. 10,000	Rs. 10,000	Rs. 10,000	Rs. 2,000	Rs. 200
17.	Power to execute contracts and other instruments except those which affect real estate for sums not exceeding.	Rs. 1,00,000	Rs. 50,000	Rs. 10,000	Rs. 10,000	Rs. 10,000	Rs. 2,000	Rs. 200
18.	To sanction direct purchase of stores of foreign manufacture in case of emergency.	Rs. 20,000	Rs. 10,000	Rs. 2,000	Rs. 2,000	Rs. 2,000	Rs. 500	Rs. 100

19.	To sanction purchases of stores and articles of a capital nature such as scientific instruments and machinery (including live-stock).	Full powers	Rs. 25,000	Rs. 10,000	Rs. 20,000	Rs. 10,000	Rs. 2,000	Rs. 200	Nil
20.	To sanction the purchase of stores required for construction work (buildings).	Full powers	Rs. 20,000	Rs. 10,000	Rs. 10,000	Rs. 10,000	Rs. 2,000	Rs. 200	Nil
21.	To sanction estimate for manufacture and repairs in workshops, controlled by Deptt. of Agriculture.	Rs. 10,000 in each case	Rs. 5,000 in each case	Nil	Rs. 10,000 in each case	Nil	Nil	Nil	Nil
22.	To sanction purchase of stores required for the manufacture and repairs undertaken by the Work-shops.	Rs. 10,000	Rs. 5,000	Nil	Rs. 10,000	Nil	Nil	Nil	Nil
23.	To increase the monetary limit for supply of stationery from the Superintendent, Printing and Stationery.	Full powers	Full powers	Nil	Nil	Nil	Nil	Nil	Nil
24.	Contracts for sale of Farm or Garden produce.	Full powers	Full powers	Full powers	Full powers	Full powers	Upto Rs. 500 a year	Upto Rs. 100 a year	Nil
25.	To accept tenders and enter into contracts for the execution of sanctioned work.	Full powers	Full powers	Rs. 10,000	Rs. 50,000	Rs. 10,000	Rs. 5,000	Nil	Nil
26.	To alter time-limit, and to remit or reduce the penalty provided in all agreements and contracts executed by the officer concerned.	Full powers	Full powers	Full powers	Full powers	Full powers	Full powers	Full powers	Nil

Sl. No.	Nature of powers to be delegated	Director of Agriculture	Jt. or Addl. Director of Agriculture	Dy. Director of Agriculture	Agricultural Engineer	Principal, Agricultural College	District Agricultural Officer	Inspector/Demonstrator
27.	To accept piece work agreements for execution of a sanctioned work within the amount sanctioned by the competent authority.	—	—	—	Full powers	—	—	Full powers
28.	To revise the rates of contracts and agreements and to fix a date from which the revision of rates is to take effect.	Full powers	Nil	Nil	Nil	Nil	Nil	Nil
29.	To dispense with earnest or security money when plant & machinery, implements, spares, etc. are supplied and erected by the firms of undoubted financial standing and repute.	Full powers	Full powers	Nil	Full powers for spares & implements only.	Nil	Nil	Nil
30.	To sanction the purchase and manufacture of office furniture and necessary estimates thereof.	Full powers	Full powers	Rs. 1,000 a year.	Rs. 1,000 a year.	Rs. 1,000 a year.	Rs. 250 a year.	Rs. 50 a year.
31.	To sanction hiring of furniture.	Full powers	Full powers	Rs. 250 for offices under him & Rs. 100 for his own office; not more than a period of 2 months in a year.	Rs. 250 for offices under him & Rs. 100 for his own office; not more than a period of 2 months in a year.	Rs. 100 not for more than 2 months in a year.	Rs. 25 a month not exceeding one month in a year.	Rs. 10 a month not exceeding one month in a year.

32	To sanction the purchase of tents and chowldaries.	Full powers	Full powers	Rs. 1,000 in each case.	Rs. 1,000 in each case.	Rs. 250 in each case.	Nil
33.	To sanction purchase of typewriters.	Full powers	Full powers	Nil	Nil	Nil	Nil
34.	To dispose of through a Commission agent or by auction or otherwise stocks (as distinct from surplus stock) of articles manufactured in Workshop.	Full powers	Full powers	Nil	Rs. 10,000	Nil	Nil
35.	To sanction refund of revenue.	Full powers	Upto Rs. 5,000	Rs. 1,000	Nil	Rs. 500	Rs. 25
36.	To sanction the write off of advances which they may have the power to sanction.	Rs. 500 in each case	Rs. 300 in each case	Nil	Nil	Nil	Nil
37.	To write off losses arising from stores of any kind (including machinery, implements, bullocks, houses, misc. articles, etc. purchased from farm or any other grants) which deteriorate or become surplus or unserviceable to the extent that they must be sold or written off.	Full powers	Full powers	Rs. 5,000	Rs. 10,000	Rs. 1,000	Rs. 25
38.	(i) To write off irrecoverable dues of Govt. seed stores, farms and gardens in cases in which recovery through revenue authorities or from sureties is not practicable.	Full powers	Full powers	Rs. 100 in each case subject to Rs. 1,000 a year.	Nil	Rs. 25 in each case.	Nil

Sl. No.	Nature of powers to be delegated	Director of Agriculture	Jt. or Addl. Director of Agriculture	Dy. Director of Agriculture	Agricultural Engineer	Principal, Agricultural College	District Agricultural Officer	Inspector Demonstrator
	(ii) To write off interest on irrecoverable dues referred to (i) above.	Full powers	Full powers	Rs. 50 in each case	Nil	Nil	Rs. 10 in each case.	Nil
	(iii) To write off losses of saleable implements due to breakage, accidents, etc.	Full powers	Full powers	Rs. 50 in each case	Nil	Nil	Rs. 10 in each case.	Nil
	(iv) To write off losses of stores due to unusual occurrence <i>e.g.</i> damage by weevils, rats, white-ants, rains, etc.	Full powers	Full powers	1% of the total stock	Nil	Nil	1% of the total stock.	Nil
39.	To write off shortages occurring due to petty theft, weightments and in transit.	Full powers	Full powers	Full powers	$\frac{1}{2}$ % Rabi seeds, 1% Kharif seeds.	$\frac{1}{2}$ % Rabi seeds, 1% Kharif seeds	Nil	Nil
40.	To write off losses due to draught in plants and grafts.	Full powers	Full powers	Upto 10%	Nil	Nil	Upto 5%	Upto 2%
41.	To sanction expenditure on demonstration of implements, improved seeds, fertilisers, etc.	Full powers	Full powers	Upto Rs. 100 in each case.	Upto Rs. 100 in each case.	Nil	Upto Rs. 25 in each case.	Nil
42.	To sell at a reduced rate surplus stock (seeds, plants and grafts).	Full powers	Full powers	Upto 2 lbs. of seed of each kind and value not exceeding Rs. 100 in each case.	Nil	Upto 1 lb. of seed of each kind & value not exceeding Rs. 50 in each case.	Upto 1 lb. of seed of each kind & value not exceeding Rs. 50 in each case.	Nil

43.	To sell at a reduced rate surplus stock, manures and fertilisers, including green manures seeds, oil-cakes, phosphatic fertilisers, blood meal and meat meal.	Full powers	Full powers	Rs. 5,000 in each case.	Nil	Nil	Rs. 2,000 in each case	Nil
44.	To sanction reappropriation and transfer of funds from one minor head or scheme to another.	Full powers	Nil	Nil	Nil	Nil	Nil	Nil
45.	To sanction drawing of advances in order to meet emergent expenditure in cases where credit purchases are not possible.	Rs. 10,000 in each case.	Rs. 10,000 in each case.	Rs. 2,000 in each case.	Rs. 2,000 in each case.	Rs. 2,000 in each case.	Rs. 500 in each case.	Nil

SUGGESTED DELEGATION OF ADMINISTRATIVE POWERS

Sl. No.	Nature of power to be delegated	Director of Agriculture	Jt. or Addl. Director of Agriculture	Dy. Director of Agriculture	Agricultural Engineer	Principal Agricultural College	District Agricultural Officer	Inspector/Demonstrator
1	2	3	4	5	6	7	8	9
1.	Power to appoint technical and ministerial non-gazetted staff.	Full power	Technical staff upto one year. Full power in regard to ministerial staff.	Technical staff upto a limit of 6 months subject to general approval of Director. Full powers in regard to ministerial staff working under him subject to general approval of Director.	Technical staff upto a limit of 6 months subject to general approval of Director. Full powers in regard to ministerial staff working under him subject to general approval of Director.	Technical staff upto a limit of 6 months subject to general approval of Director. Full powers in regard to ministerial staff working under him subject to general approval of Director.	Full power in regard to ministerial non-gazetted staff working under him subject to general approval of the Director.	Nil
2.	Power to make officiating appointment where necessary in place of Government servants sent for training.	Upto 6 months in respect of class II posts. Full powers in respect of non-gazetted staff.	Nil	Nil	Nil	Nil	Nil	Nil

3.	Power to make officiating appointments where necessary by local promotion.	Full power	Upto 3 months under intimation and substitution of Director of Agriculture in due course.	Upto 3 months under intimation and substitution of Director of Agriculture in due course.	Upto 3 months under intimation and substitution of Director of Agriculture in due course.	Nil
4.	Power to permit charge of a gazetted Government servant to be made elsewhere than at headquarters.	Full power	Nil	Nil	Nil	Nil
5.	Power to make transfers of class II officers and Technical & non-gazetted ministerial staff.	Full power	Full power in regard to technical & ministerial non-gazetted staff.	Full power in regard to ministerial non-gazetted staff within his jurisdiction subject to intimation being sent to Director.	Full power in regard to ministerial non-gazetted staff subject to intimation being sent to Director.	Nil
6.	To sanction honoraria to Government servants.	Non-recurring upto Rs. 1000 in each case subject to an annual limit of Rs. 5,000.	Non-recurring upto Rs. 500 in each case subject to an annual limit of Rs. 2,000.	Non-recurring upto Rs. 100 in each case subject to an annual limit of Rs. 500.	Non-recurring upto Rs. 100 in each case subject to an annual limit of Rs. 500.	Nil
7.	To permit acceptance of a fee by a Government servant.	Non-recurring fee or fees not exceeding Rs. 2,000 in each case, recurring upto Rs. 100 in each case.	Non-recurring fee or fees not exceeding Rs. 1000 in each case, recurring upto Rs. 50 in each case.	Non-recurring upto Rs. 500 in each case, recurring not exceeding Rs. 20 in each case.	Non-recurring upto Rs. 500 in each case, recurring not exceeding Rs. 20 in each case.	Nil

Sl. No.	Nature of power to be delegated	Director of Agriculture	Jt. or Addl. Director of Agriculture	Dy. Director of Agriculture	Agricultural Engineer	Principal Agricultural College	District Agricultural Officer	Inspector/Demonstrator
8.	Power to grant subsistence allowance drawn by a suspended Government servant, in excess of that permissible under normal rules.	Full power	Nil	Nil	Nil	Nil	Nil	Nil
9.	Power to withhold increments of gazetted officers if their conduct or work has not been satisfactory.	Full power	Nil	Nil	Nil	Nil	Nil	Nil
10.	Power to withhold increments of non-gazetted staff if their conduct or work has not been satisfactory.	Full power	Full power	Full power in respect of staff working in his jurisdiction.	Full power in respect of staff working in his jurisdiction.	Full power in respect of staff working in his jurisdiction.	Full power in respect of staff working in his jurisdiction.	Nil
11.	Power to allow gazetted officers to cross efficiency bar.	Full power	Nil	Nil	Nil	Nil	Nil	Nil
12.	Power to allow non-gazetted officers to cross efficiency bar.	Full power	Full power	Full power in respect of staff in his jurisdiction.	Full power in respect of staff in his jurisdiction.	Full power in respect of staff in his jurisdiction.	Full power in respect of staff in his jurisdiction.	Nil
13.	Power to suspend class II officers on the condition that a report about the reasons therefor is sent immediately to Government.	Full power	Nil	Nil	Nil	Nil	Nil	Nil
14.	Power to suspend non-gazetted staff.	Full power	Full power	Full power in respect of staff in his jurisdiction.	Full power in respect of staff in his jurisdiction.	Full power in respect of staff in his jurisdiction.	Full power in respect of staff in his jurisdiction.	Nil

15.	Power to grant extension of service or re-employment after superannuation to all non-gazetted Govt. servants not exceeding one year.	Full power	Nil	Nil	Nil	Nil	Nil	Nil
16.	Power to retain a ministerial Govt. servant in service even after the age of 55 years but not exceeding 60 years.	Full power	Nil	Nil	Nil	Nil	Nil	Nil
17.	Power to grant leave extending beyond the date of superannuation to non-gazetted Government servants.	Upto a limit of 6 months after superannuation provided such leave was due but had been refused to the Govt. servant in the public interest.	Nil	Nil	Nil	Nil	Nil	Nil
18.	Power to grant daily allowance and to sanction halt beyond 10 days.	Upto a limit of 60 days in individual cases.	Nil	Nil	Nil	Nil	Nil	Nil
19.	Power to grant fixed T.A. or fixed conveyance allowance where considered necessary.	Subject to a limit of Rs. 100 p.m. for gazetted & Rs. 40 for non-gazetted Govt. servants.	Nil	Nil	Nil	Nil	Nil	Nil

Sl. No.	Nature of power to be delegated	Director of Agriculture	Jt. or Addl. Director of Agriculture	Dy. Director of Agriculture	Agricultural Engineer	Principal Agricultural College	District Agricultural Officer	Inspector/Demonstrator
20.	Power to allow T.A. for journey to join first appointment in Govt. service wherever considered essential.	Full power	Nil	Nil	Nil	Nil	Nil	Nil
21.	Power to permit officers to attend conferences and meetings in any part of India provided such meetings and conferences relate to the special subject dealt with by that officer.	Full power	Nil	Nil	Nil	Nil	Nil	Nil
22.	Power to allow daily allowance at a place of training.	Upto such extent and as may be considered necessary in each case.	Nil	Nil	Nil	Nil	Nil	Nil
23.	Power to act as controlling authority in respect of T.A. of gazetted officers.	In respect of bills of all class I officers and those class II officers who are not under the direct subordination of any class I officer.	In respect of bills of class II officers under him.	In respect of bills of class II officers within his jurisdiction.	In respect of bills of class II officers within his jurisdiction.	In respect of bills of class II officers within his jurisdiction.	Nil	Nil

24.	Power to fix the headquarters of any post within the state.	Full power	Nil	Nil	Nil	Nil
25.	To pass orders on reimbursement of cost of medical treatment of Govt. servants and their families.	Full power	Full powers in respect of officers under him.	Full powers in respect of officers under him.	Full powers in respect of officers under him.	Nil
26.	To sanction advance from G.P. Fund and C.P. Fund for special reason.	Full power upto the balance of account.	Full power upto class II officers.	Full power in respect of non-gazetted staff under him (upto the balance of account).	Full powers in respect of non-gazetted staff under him (upto the balance of account).	Nil
27.	Power to grant leave to a Govt. servant in respect of whom a medical committee has reported that there is no reasonable prospect that he will ever be fit to return to duty.	Full power	Full power in respect of staff whom he is competent to grant leave.	Full power in respect of non-gazetted Govt. servants to whom he is competent to grant leave.	Full power in respect of non-gazetted Govt. servants to whom he is competent to grant leave.	Nil
28.	Power to grant leave (other than disability leave and leave extending beyond the date of compulsory retirement) to a gazetted Govt. servant who is not in foreign service.	Full power under intimation to Government.	Nil.	Nil	Nil	Nil
29.	Power to grant leave (other than disability leave and leave extending beyond the date of compulsory retirement) to non-gazetted Govt. servant who is not on foreign service.	Full power	Full power in respect of Govt. servants in his jurisdiction.	Full power in respect of Govt. servants in his jurisdiction.	Upto six weeks in respect of staff when he is the appointing authority.	Nil

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Sl. No.	Nature of power to be delegated	Director of Agriculture	Jt. or Addl. Director of Agriculture	Dy. Director of Agriculture	Agricultural Engineer	Principal Agricultural College	District Agricultural Officer	Inspector/Demonstrator
30.	Power to sign the entries in the leave accounts, service rolls and service books of non-gazetted ministerial, inferior and petty staff and to sign requisitions and indents for stationery and printing of forms, reports etc.	Full power. This power may also be exercised by any officer authorised by him.	Full power	(1) Full power in respect of staff working under him. (2) The monetary limits fixed in the case of stationery are not exceeded.	(1) Full power in respect of staff working under him. (2) The monetary limits fixed in the case of stationery are not exceeded.	(1) Full power in respect of staff working under him. (2) The monetary limits fixed in the case of stationery are not exceeded.	(1) Full power in respect of staff working under him. (2) The monetary limits fixed in the case of stationery are not exceeded.	Nil Nil
31.	Power to grant increments to the ministerial staff.	Full power	Full power	Full power in respect of staff working under him.	Full power in respect of staff working under him.	Full power in respect of staff working under him.	Full power in respect of staff working under him.	Nil
32.	Power to grant study leave.	Full power	Nil	Nil	Nil	Nil	Nil	Nil

VIII

PROCEEDINGS OF THE CONFERENCE OF STATE MINISTERS
OF AGRICULTURE, HELD ON THE 6TH FEBRUARY, 1959.

(Plenary Session - 10 A.M. to 1.30 P.M.)

* * * *

The Conference was inaugurated by the Minister for Food & Agriculture, Shri Ajit Prasad Jain, who highlighted the salient recommendations of the Agricultural Administration Committee and the important suggestions made in connection with the Kharif Production Drive. (Copy of the speech appended.)

2. The Conference, there-after, re-assembled for the business session and each State Minister made general observations, the gist of which is indicated below.

3. Shri Thimma Reddy, Agriculture Minister of Andhra Pradesh, congratulated the Agricultural Administration Committee for having produced a useful report. He pointed out that the implementation of the recommendations would require additional funds which would be difficult to find within the plan ceilings fixed for the State. He emphasised that the schemes in the agricultural Sector should on no account be allowed to suffer for want of adequate funds or availability of foreign exchange or control by other Ministries.

The Minister observed that his State had already taken steps to launch the Kharif campaign on the lines suggested by the Central Ministry of Food & Agriculture. He, however, emphasised the need for adequate and timely supply of Agricultural Credit to the farmers. He also wanted loans to be provided for raising orchards, and cash crops like cashewnuts. The need for supply of chemical fertilisers in larger quantities was also stressed in view of the growing demand for the fertilizers in his State.

4. Shri Chaudhary, Agriculture Minister of Assam, observed that the State had set up a Committee to go into the working of the Agricultural Department even prior to the formation of the Agricultural Administration Committee and the State Committee, had re-organised the Department of Agriculture, which covered a number of recommendations

of the Administration Committee. As a result of such re-organisation, the Departments of Cooperation, Veterinary and Irrigation have been placed under the Minister for Agriculture. Similarly, the Secretary, Agriculture, is in charge of Cooperation, Animal Husbandry and Irrigation. They had also taken steps to divide the state into zones, each under a Joint Director of Agriculture, who would be a Class I Officer in the scale of Rs. 800-1150. The scales of pay of other categories of personnel in the Department have been also revised upwards, e.g., District Agricultural Officers will be in the grade of Rs. 350-900 and the Sub-Divisional Agricultural Officers will have a scale of pay of Rs. 250-600. A decision has also been taken that no Agricultural Graduate will get less than Rs. 170/- in the scale of Rs. 170-350. It was expected that, with the revision in the scales of pay of field staff, the conditions of service in the state would improve.

Another important step, taken by the State Government is the formation of Field Management Committees for planning and execution of the Agricultural Programme. These Committees will fulfil the objective of planning from the village upwards. While commending the recommendation regarding training of farmers and other Extension workers, the Minister pointed out that they had proposed to set up 4 Agricultural Schools on zonal basis, out of which 3 had already been established.

The Minister indicated that the Kharif Production Campaign would be launched in the State on the lines suggested by the Centre. He, however, pointed out the difficulty caused by the disparity between prices of Ammonium Sulphate used in tea gardens and for agricultural purposes. This disparity, he thought, led to the diversion of fertilizers to Tea industry at the cost of food crops.

5. Shri B. C. Patel, Agriculture Minister of Bihar, expressed high appreciation of the work done by the Agricultural Administration Committee. He referred to the remarks made by the Minister for Food & Agriculture in his inaugural speech about low yields of paddy in Bihar. While not going into the reasons for this low yield, he pointed out

that one important factor which could not be ignored was the ratio between irrigated and un-irrigated land in Bihar as compared to some of the other States where the yields per acre were high. He gave an assurance that all possible measures would be taken to raise the yields. He pointed out that majority of the recommendations of the Committee had already been implemented by the State Government. The Agricultural Education in the State had been considerably strengthened with the two Colleges of Agriculture, one with post-graduate training, over and above a large number of schools. He suggested that while the dominant consideration for promotion should be merit, the seniority factor could not be altogether overlooked. A via-media had naturally to be evolved. While he was personally in favour of formation of an All-India Agricultural Service, he felt that this might also lead to the demand for similar services for other departments. This question, therefore, required a fuller examination. He pointed out that the State Government had been able to secure full coordination between different Development Departments by making the Development Commissioner as the Principal Secretary to the Government who occupies a position midway between the Secretary and the Minister. The State had also established four Regional Research Stations, two of which were located in the Agricultural Colleges. They had also taken steps to provide subject-matter specialists at District and Sub-Divisional levels.

The Minister indicated that the State had already mounted a Kharif Production Campaign during the last season. This was followed by an intensive Rabi Production Campaign in which the State Government had trained 1 lakh Project Leaders. In the next Kharif Production Campaign which will be undertaken on a still more intensive scale, it is proposed to train 1 million progressive farmers.

It was also pointed out, that the Plant Protection measures to be adopted during these campaigns should cover a much wider field and the rat destruction campaign could form an important item of plant protection measures.

6. Mr. Naik, Agriculture Minister of Bombay, commended the

Agriculture Administration Committee Report as excellent and expressed his general agreement with the recommendations. He attached the greatest importance to the recommendation regarding recognition of agricultural department as a major department. He felt that, in at least some of the major states, it may be necessary to create a post of Agricultural Commissioner with adequate powers to control other departments connected with food production. He also agreed with the recommendation that the officers of Agriculture Department should be given the same status as their counter-parts in other departments and that merit along with seniority should be given due consideration for promotion. He observed, that the decentralisation of powers - both administrative and financial, at various levels, was absolutely necessary for smooth functioning of the department and that the budget should always be an "Operational Budget". Repeated references of the approved schemes to the Finance Department caused unnecessary delay in their implementation and should be avoided. He commended the recommendation for making lump-sum provision for various schemes.

The Minister considered the outline of Kharif Production Campaign suggested by the Centre as a very comprehensive and useful one. While he indicated that preparations for launching the Kharif Production Drive have already begun, there are two important points which need to be looked into. Adequate quantities of fertilisers should be made available to the cultivators, and if necessary, preference should be given to the import of fertilisers rather than to the import of foodgrains. Similarly, there was acute shortage of plant protection equipments like sprayers and dusters. The state had not been able to procure the required quantity of these equipments and, consequently, as much as 10 lakhs out of the total provision of Rs. 25 lakhs made for this purpose is likely to remain unutilised by December, 1959. He felt that, power sprayers and dusters should, under these circumstances, be imported. He also referred to the shortage of iron

and steel which was required not only for the manufacture of agricultural implements but also for engines and pumps. He put the state's requirements of ammonium sulphate and super-phosphate in connection with the Kharif campaign at 45000 tons and 35000 tons respectively. He emphasised that, with an expenditure of about Rs. 9 lakhs on the Kharif campaigns, it may be possible to produce foodgrains worth Rs. 10 crores. Under these circumstances, it was obligatory that adequate facilities should be provided for making the campaign a success. For execution of the programme, the Minister pointed out that the Farmers' Unions were being formed at the village level and necessary training of progressive farmers was being arranged. It was only by utilising these trained farm leaders that necessary enthusiasm for the drive could be generated amongst farmers.

7. Dr. K. N. Katju, Chief Minister, Madhya Pradesh, also congratulated the Agricultural Administration Committee for having produced such a useful report. He indicated that the question of integration of services and pay scales of the four units comprising the reorganised Madhya Pradesh State is now receiving attention and the recommendations of the Agricultural Administration Committee would be given due consideration. He felt, that the suggestion of the Committee to combine the portfolios of Irrigation, Agriculture, Animal Husbandry, Cooperation, etc. under one Minister was not feasible. It may be more desirable to constitute a standing Cabinet Sub-Committee composed of the Ministers in-charge of different Development Departments for necessary coordination. He suggested that the ocular demonstration was effective in convincing the farmers of the efficacy of improved methods of cultivation and, for this purpose, utmost emphasis need be given to the establishment of Village Demonstration Farms. It may also be desirable for every officer of the Department of Agriculture, from the Director of Agriculture downwards, to adopt a particular village for establishing direct contact with the farmers, understanding their problems and find out practical solutions. Another way to

extend the results of research to the door-steps of farmers may be to introduce agricultural graduates to/ settle on farms and to practise improved farming. The farms operated by such agricultural graduates will serve as centres for dissemination of knowledge regarding improved techniques. He also felt that the technical staff of the departments should not be burdened with routine administrative matters.

The Chief Minister indicated that the state will launch the Kharif Production Campaigns on the lines suggested by the Centre and assured fullest cooperation in making it a success.

8. Shri Bhaktavatsalam, Agriculture Minister of Madras, pointed out that his State had anticipated some of the recommendations made by the Agricultural Administration Committee and taken steps to implement them. He indicated that a Committee had already been set up to undertake a comprehensive survey of problems relating to agricultural production. The schemes, such as: upgrading of the College of Agriculture at Coimbatore, subsidy on green manure, seed, which were considered useful, were being executed without any definite assurance from the Centre for financial assistance. While the Director of Agriculture in the State was an experienced administrative officer with no technical qualifications, the Additional Director of Agriculture was a technical man who looked after research and education. Five Joint Directors of Agriculture, dealing with subjects like inspection, development, agricultural engineering, community development work and seed farms are already functioning in the State. At the district level, there is one Agricultural Officer in each district and the larger districts have been bifurcated into two units, each having one Agricultural Officer.

The Minister indicated that he was not very enthusiastic about the formation of an All-India Agricultural Service. However, the possibility of setting up a higher cadre to attract qualified people may have to be considered. He pointed out that the coordination between the different departments was being achieved through the State Development Committee, both at Minister's and Officer's levels. In

addition, the Commissioner for Food Production in the State coordinated the programmes of Agriculture and Irrigation Departments. The State had also a Research Council with heads of different departments as members, which was effective and had the last say on all research problems. The State had as many as 28 agricultural research stations, a few of which are proposed to be upgraded as Regional Research Stations.

While the per acre yield of rice, which is the major crop to be taken up for the Kharif Production Campaign, was amongst the highest in India, the Minister pointed out that efforts would be made to increase the yield still further. The State had already undertaken the planning of the Kharif production drive and produced a guide book in regional languages similar to the one circulated by the Centre. He laid great stress on the need to assure fair prices to the farmers for their produce and its determination and declaration well in advance.

9. Shri Patil, Minister of Agriculture, Mysore, indicated that the Department of Agriculture was considered a major department in his State, and merit and seniority both counted for promotion. They had also taken steps to appoint a Joint Director of Extension and attach an Administrative Officer to the Director of Agriculture for looking after administrative matters. The pay scales had also been revised in 1957 and it was not possible to consider further revision for some time to come. These scales of pay, however, were quite near to those recommended by the Agricultural Administration Committee. The percentage of temporary staff in the department was 46 and an effort was being made to reduce it to 25. The recommendation relating to decentralization and delegation of powers at various levels had already been implemented and budget procedures had also been considerably simplified. The Minister pointed out that the minor irrigation programmes were still under the charge of the State P. W. D., but they were pursuing the question of having a separate Works Division in the

Department of Agriculture for attending to irrigation and other construction schemes. The question of formation of an All India Agricultural Service needed further consideration and the State Government had not yet made up their mind in the matter.

While the Kharif campaign on the lines suggested by the Centre will be launched in the State, the Minister pointed to the shortage of iron and steel for manufacture of plough points. He also mentioned that the State was not able to get insecticides, sprayers and dusters in time for saving crops from pest attacks. The Minister also made a plea for sanction of loans for sinking of wells at the rate of Rs. 3 thousand per well, as the existing rate of Rs. 1 thousand was not enough.

10. Shri Rath, Agriculture Minister of Orissa, while commending the recommendations of the Agricultural Administration Committee, pointed out that his State had not so far been able to achieve the necessary amount of integration and coordination at the top level. While the Minister for Agriculture was in charge of other Development Departments also, the Community Development was under a different Minister. Similarly, minor irrigation was being handled by two or three different Departments, such as Revenue, Tribal and Rural Welfare, Agriculture, etc. He suggested that if all the portfolios could not be combined under one Minister, it may be desirable to constitute a Sub-Committee of the Cabinet for achieving coordination between different Development Departments. He assured that integration of research, extension and education was being carried out in his State and will be completed in the next two years. He pointed out that it had not been possible for the State to revise the pay scales, specially of the lower staff, on account of the paucity of funds. He, therefore, made a plea for Central Assistance, so that this important recommendation could be carried out.

Similarly, he wanted that additional funds should be provided, over and above the Plan allotment, for taking up minor irrigation programmes. He emphasised the need for fixing reasonable prices for agricultural produce as an incentive for increased production.

11. Shri N. R. Mirdha, Agriculture Minister of Rajasthan, while joining his colleagues in the appreciation of the work done by the Agricultural Administration Committee, observed that the recommendations, which do not involve any financial commitments, will be implemented as soon as possible. So far as the recommendations having some financial implications are concerned, the Agricultural Department alone cannot take any decision in regard to their implementation and as such it will take the State Government some time to give effect to them, in consultation with other concerned departments. The Minister pointed out that perfect coordination had already been achieved at state and district levels and village-wise targets of agricultural production have been fixed in consultation with the villagers.

The Minister observed that satisfactory work had been done in regard to the distribution of seeds, fertilizers and implements under the current Rabi Production Campaign and hoped that the campaigns would be a success. They have also completed the planning of the next Kharif Production Drive in which improved seeds of Jowar, bajra, etc., to a limited extent will also be distributed.

12. Shri M. L. Gautam, Minister for Agriculture and Cooperation, Uttar Pradesh, pointed out that there would be no difficulty in implementing the recommendations of the Agricultural Administration Committee, which do not involve any financial commitments. The implementation of other recommendations which involve financial implications will require additional funds which the State may not be able to find from within their existing resources. In view of this, the Minister made a strong plea for Central assistance so that such recommendations could be given effect to within the stipulated target date. He further pointed out that while the existing scales of pay in the Department of Agriculture can be favourably compared with those in any other State, his State will be inclined to consider any suggestions for improvement provided the financial assistance from the Centre is forthcoming. The question of merit vs. seniority was

also being taken into account for promotions in the State.

Similarly, the recommendation relating to delegation of powers, both administrative and financial, has already been implemented. Adequate steps were also being taken to make the temporary staff of Agriculture Department permanent at the rate of 33% every year. The State Government have also taken decision to transfer the trading functions of the Agriculture Department to Cooperatives. With the establishment of the Rural University at Rudrapur, the coordination between research, Extension and education will receive a further fillip in the State.

The Minister observed that his State had taken lead in launching Kharif production Campaign similar to the one now suggested by the Central Ministry of Food and Agriculture. The last Kharif Production Drive had yielded satisfactory results and the production of rice was estimated to have gone up from 22.90 lakh tons to 28.55 lakh tons. As against 2½ lakh Gram Sahayaks trained during the current Rabi Campaign, they propose to train 1 million Gram Sahayaks for the next Kharif Campaign. It will, thus, be possible to utilise Gaon Sabhas for execution of the programme. The Minister pointed out that the supply of nitrogenous fertilizers should be speeded up so that it could be made available to the farmers in time. The Minister for Food and Agriculture gave assurance that all available fertilizers allotted to Uttar Pradesh will be moved by the end of May, 1959.

13. Dr. R. Ahmed, Agriculture Minister, West Bengal, pointed out that the re-organisation of the Department was already under way and that the West Bengal Government was absolutely opposed to the creation of an All India Agricultural Service.

While the Kharif Production Campaign would be launched in the State on the lines suggested by the Centre, the Minister indicated that one important factor which has to be taken into consideration is the price support as this alone would provide the real incentive to the farmers for increasing production. It was no incentive for the farmer to produce more and suffer on account of receiving lower and uneconomic prices as in the case of jute.

JUNEJA/
6/2/59

PROCEEDINGS OF THE CONFERENCE OF STATE
OFFICIALS HELD ON 6TH FEBRUARY, 1959.
(Afternoon session - 2.30 P.M. to 7 P.M.)

Category A: Recommendations with no financial implications requiring immediate implementation.

<u>Paragraph Reference</u>	<u>Summary of recommendations.</u>	<u>Recommendations made by the Conference of State Officials.</u>
2.3.	In the opinion of the Committee, this tendency of depending upon stimulus from the Centre for taking action on a subject which is the main responsibility of the State is not a healthy one.	Noted for general guidance. The question of Central Government giving more funds for agricultural research was raised. It was explained that the responsibility of the States for local research could not be disowned. In the case of the States which are already spending substantial funds for research and are not in a position to find additional funds for new research schemes, the question of centre giving more liberal assistance would be considered on merits of each case. The recommendation of the Indo-American Team for distributing Rs.2 crores annually to the States for augmenting their funds for agricultural research would be pursued in the Third Plan.
2.4.	The Committee has recommended that the States should periodically undertake an examination of the structure, objectives and policies of the Department of Agriculture.	Accepted.
2.13 & 2.14.	This recommendation relates largely to the appointment of technical officers in the top posts in the State Departments of Agriculture. The Prime Minister has remarked that top posts in the State Agriculture Departments should be manned by technical men with practical experience of agricultural problems.	It was clarified that the recommendation related to the appointment of Directors of Agricultural and Veterinary Services in the States. The recommendation was accepted except by the Madras representative who clarified that it would not be possible for the State to reserve it for any particular service, technical or administrative.
2.15	The Committee has recommended that suitable steps should be taken to remedy the situation arising from lack of recognition of the Agriculture Department as a major and important Department. The willingness to do so is still lacking and the importance attached to Agriculture has to be reflected in a concerted effort to improve the conditions of agricultural services.	Accepted.

2.28 The Committee has emphasised the & need for adequate recognition of merit at all stages and has suggested that those who do not show initiative and progress should not get their advancement in service merely because they happen to be senior.

Accepted with the proviso that merit coupled with seniority will be taken into consideration with regard to promotions. In States where posts have been classified into selection and non-selection posts, the principle is already being followed with regard to selection posts.

3.12. The Committee has emphasised the need for advanced planning of training programmes in foreign countries. This assessment should be done on a long-term basis for each State and panels of suitable candidates for different subjects kept ready. The Committee has recommended that the State and the Central Government should nominate only those candidates for foreign training whose names are on the approved panel prepared in advance. The Central Ministry of Agriculture should keep such a panel of names handy so that fullest use can be made of the educational assistance offered by foreign countries. Steps have also to be taken to ensure that officers after receiving training abroad are posted back to the subject of their specialisation.

Accepted.

3.14. The Committee has recommended that periodical examinations should also be held for departmental staff after they have received training or have attended refresher courses and those who fail to pass these examinations should not be confirmed, promoted or permitted to cross the efficiency bar. The Committee has specially made this recommendation in view of the prevailing tendency to attach little importance to refresher and other courses held by State Departments and to treat them more as a holiday at the cost of Government.

The need for Refresher Courses to tone up efficiency was generally recognised. Each State will have to work out its own procedure for achieving the objective. System of examinations to determine confirmation and promotion was favoured. It was agreed, however, that the States would provide facilities for training to particular groups where such training was considered essential. Wherever such training facilities are provided, the staff would be expected to take full benefit of the facilities and this would be determined by appropriate assessment.

3.15. For recognising competence, initiative and keenness, it is necessary that there should be adequate and thorough technical supervision at different levels. The Committee has emphasised that the right types of officers should be located, trained and their work appreciated properly.

Accepted.

- 3.16 For the assessment of the quality and quantity of work turned out, rather than of the personality of the individual, the Committee has recommended assessment by special Boards once in 3 years. In case of gazetted officers, the Committee has recommended that State Governments should have agricultural scientists and technical men of repute as members of the Assessment Board. These reports will enable the Director of Agriculture to assess the work of his departmental officers periodically.
- Not accepted. As the majority view was that outsiders brought on an ad hoc basis would not be competent to judge the quality of work of a State Officer, such assessment should be left to the Head of the Department.
- 4.2. The Committee has noticed a tendency that the coordinating bodies in the States function in a routine manner and there was little evidence of systematic follow-up action. These coordinating bodies do not meet often and in the absence of adequate vested authority, they cannot operate successfully. To secure better coordination of work, pattern prevailing in one State in which the Development and the Food Production Commissioner functions as the Principal Secretary to Government and occupies a position which is mid-way between the Secretary of a Department and the Minister-Incharge. The Principal Secretary has been vested with sufficient powers such as the authority to write the confidential reports of the Secretaries to Government and Heads of Departments with which he is concerned.
- The measure suggested in this recommendation is already functioning in Bihar. Other States were unable to accept the suggestion of administrative difficulties. It was agreed, however, that the suggestion made by the Chief Minister, Madhya Pradesh, for an effective Coordinating Sub-Committee of the Cabinet should be able to fulfil the requirement mentioned in this recommendation.
- 4.3. The Committee has expressed the view that there are far too many directives from the top and there is too little supervision and effort to look to matters on the field. Field Officers are burdened with far too many returns - in some States as many as 30 to 40 returns have to be prepared and submitted every month. In the opinion of the Committee coordination does not mean multiplicity of reports and returns. What is required for purposes of coordination is that coordinating committees must meet frequently on pre-determined dates and such meetings should receive due priority. The Committee has recommended that at all levels, sufficient power and authority should be vested in the coordinating committees.
- Recommendation was accepted. The Centre was also requested to take similar action and at least replace monthly reports by quarterly reports.

- 4.4 In these paragraphs, the Committee Accepted.
to has suggested a method for the
4.6 coordination of research, extension and educational programmes in the State Agriculture Departments. The personnel of such coordination committees has also been suggested.
- 5.2 The Committee has also suggested Accepted.
that heads of research sections should continuously study and evaluate the progress made in extending the recommendation of the research officers and translating them into field practices. This study should be carried out by experienced officers of the research sections.
- 5.3 The Committee has emphasised the Accepted.
to need to have an intensive drive
5.5 with a view to promoting follow up work, as greater emphasis has to be placed on the actual achievement and not so much on the potential created. The inspecting officers during their inspections can assist considerably in emphasising these points by making a study of the follow up programme and the use to which a particular facility is actually put. The Committee has felt that inspection and supervision have been relegated to the background and have been replaced by ad hoc short visits of the supervising officers for solving immediate problems or for gathering urgent information. The Committee has, therefore, recommended that these instructions should now be implemented and the work-load of inspecting officers should also be studied.
- 5.6 The Committee has suggested senior Accepted.
officers should be in continuous touch with the working progress under their control through a system of oral reports from officers immediately below them on a prescribed date in a week or a fortnight. Such oral reports would provide opportunities for officers at all levels to discuss with their senior officers local problems periodically and help the senior officers to keep the work under continuous review.
- 6.7 The Committee has in this paragraph referred Accepted.
to the role of Agriculture Departments in policy making and has emphasised the importance of programme planning. In paragraphs 2.4 and 2.5, the Committee has, in this context, recommended that both in the States as well as at the Centre, special committees consisting of eminent agricultural administrators, scientists and progressive farmers should be appointed once in 5 years to examine programmes and policies so as to provide a balanced growth by enunciating programmes and policies in consonance with existing needs.

6.8 The Committee has emphasised
to the necessity for developing
6.10 self-help programmes which
could benefit the small farmer
who is generally non-credit-
worthy in the usual sense of
word. The purpose of these
self-help programmes is to
decentralise the distribution
and multiplication of improved
seed and also to reduce the
quantities handled, transpor-
ted, stored and distributed by
Government. For building up soil
fertility, three basic problems
viz., green manuring, production
of compost and planting of fuel
trees as pointed out by the
Committee, are capable of uni-
versal adoption. This would
leave the Department or Depart-
ments of Agriculture free for
carrying out their educational
campaign. The local multipli-
cation of seed, the production
of local manurial resources and
the production of additional
fuel for the farmer are the
three big problems which can be
taken over extensive areas all
over the country and for this
purpose, the Department of Agri-
culture should be left free to
carry out this programme and
provide the necessary encourage-
ment and drive for the purpose.

With regard to the plant pro-
tection measures, the Commi-
ttee has suggested that farmers
should be persuaded and helped
to own equipment and insecticides,
either cooperatively or in-
dividually while the Departments
of Agriculture should organise
demonstrations and a post
warning service and should also
keep available big power equip-
ment to combat pests and disease in an
epidemic form.

6.11 The Committee has recommended that
State Agriculture Departments
should evolve plans for increasing
agricultural production in every
village rather than for exe-
cuting the targets of distri-
bution of seeds, fertilisers
etc. If integrated plans for in-
creasing the production and exe-
cuted, the targets prescribed
are pre-for the Second Five Year Plan
pared will be taken care of automatically.

Accepted. Some of the State
representatives, however, expressed
the view that the central share
of the subsidy in developmental
grants which reached the cultivator
should be made available even if
the States were not in a position
to find funds for their matching
grants. It was explained on
behalf of the centre, however, that
as the grant was intended to
reduce the cost to the cultivator
both the centre and the States
will have to play their part.

It was felt that with the
existing staff planning at
village level was impracticable.
However, it was agreed that
planning up to Block level would
be done in the National Exten-
sion Service Blocks; in the
shadow blocks it would not be
possible for want of staff.

7.1 The Committee has observed that to the existing procedures of bud-
7.7 getting and the incurring of expenditure retarded the progress of work and the execution of schemes in the agricultural sector. The Committee has, therefore, recommended that means should be devised to ensure that the expenditure is not concentrated during the last quarter of the financial year. In the same context the Committee has recommended that various stages of action from the formulation of schemes to their implementation should be completed more expeditiously and unnecessary references to the Centre and the State Finance Departments should be eliminated. The Committee has, therefore, suggested that certain consequential readjustments in the calendar that might have been laid down for the preparation and presentation of the budget in the State Legislatures may be undertaken.

A lumpsum provision may be made in respect of the schemes for which complete and detailed examination cannot be made due to lack of technical data.

Once the schemes have been included in the budget after proper scrutiny, a second reference to the Finance Department for expenditure sanction before their implementation should not be necessary.

7.10 The Committee has observed that to implementation of projects suffer
7.15 due to lack of powers of the officers entrusted with implementation. In the interest of speedy execution, there should be greatest delegation of powers at all levels from the Director of Agriculture downwards. Financial powers of officers at all levels should be examined urgently and wherever necessary revised, taking into consideration the changing needs of the expanded development programme. The Committee has made suggestions for Financial and administrative powers which may be delegated to officers at various level in the State Agricultural Departments.

Accepted with the modification that with regard to work expenditure bunching of expenditure at the end of the year could not be avoided to some extent.

Accepted. Each State would examine the maximum delegation of powers at all levels.

7.20 After the delegations suggested above have been made, the Committee has suggested that steps should be taken to codify all financial and administrative powers now distributed over different books and executive instructions. The Officers should have a clear indication of their financial and administrative powers.

Accepted.

21 The Committee has recommended that officers taking initiative and responsibility should feel that Government trusts them in the exercise of their powers and the delegation of powers should be both in letter and in spirit. Executive instructions which circumscribe normal financial and administrative powers of officers should be issued only after due consideration and for very weighty reasons. The Committee has recommended that a review of all such instructions should be made every six months preferably by a Committee appointed by the State Governments with a view to removing them or making them part of the permanent rules where considered absolutely necessary. Temporary restrictions should not be allowed to remain in force for more than six months.

Accepted.

7.22 Each Officer should be given as an ad hoc measure, powers to execute specified schemes for which budget provision has been made even though the expenditure on a particular item may exceed his normal financial powers. Such ad hoc authorisation may be effective during a particular financial year and give absolute power to certain Officers on important schemes within the ceiling of the budget provisions and subject to their observing other codal formalities.

It was agreed that the suggestion was very useful but would require examination by the States sympathetically in the light of other financial considerations.

for the agricultural extension staff to concentrate solely on educating and organising the farmers to produce more; in other words, the department should deal with technical knowledge and education rather than trade in supplies.

P.T.O.

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- 7.23 Indenting departments should be
to authorised to purchase direct,
7.24 instead of through the State
purchasing Organisations,
technical stores and stores of
value after observing codal
formalities. The existing
procedure impedes the execution of
Plan schemes and much labour and
time will be saved if the
Identifying Departments are autho-
rised to effect purchases direct
after observing the codal forma-
lities. Similarly the Committee
has suggested that discretionary
powers should be given to
Officers incharge of State Trans-
port Vehicles engaged on essential
food production work to get
emergency repair done outside the
departmental workshops, where the
interest of public service
justifies this course.

Rules should be examined
by the States and amended
if necessary.

- 9.1 The purpose and junctions of
the Agricultural Departments,
according to the Committee, should
be not only to provide facilities
for educating and training the
farmers, but also for training
the personnel required for
manning the services connected
with agriculture. The Agricultural
Departments should demonstrate
to the farmers better methods of
cultivation and disseminate
knowledge about these methods
through various audio-visual
channels and organise farmers
for adopting the improved tech-
niques of crop production and
working together for purposes
of common benefit in activities
such as land development,
protection of crops, marketing
and organisation of self-help
programmes.

Accepted,

- 9.2. The Committee has recommended that the feasibility of the portfolio of Agriculture and Irrigation being held by one Minister should be considered. There is a gross lack of coordination between the Agriculture and the Irrigation Departments and it appears desirable to place the responsibility for both in a single authority.

The Committee has further recommended that the feasibility of all subjects connected with agriculture being distributed between two Secretaries to Government should also be examined. They have suggested that the Secretary for Agriculture may deal with agriculture, land reclamation, soil conservation in agricultural lands, animal husbandry and Veterinary science and the Secretary for Irrigation may deal with irrigation, forests including soil conservation, cooperation and agricultural marketing.

The Committee has also recommended that frequent changes should be avoided.

- 9.3. The Committee has recommended that the construction of irrigation wells and construction of repairs of small minor irrigation works which do not cost more than Rs. 10,000 should be the responsibility of the Community Development Agency. The Agricultural Departments should attend to minor irrigation works costing above Rs. 10,000 but generally not more than about Rs. 80,000. Works costing more than about 80,000 may be handled by the Irrigation Department.

No comments were offered, as this was considered by the Ministers in the Morning Session and there was general feeling that the combination of agricultural and irrigational portfolios under one Minister might be cumbersome. The Ministers had also suggested that coordination between the two Ministries could be effected by a Sub-Committee of the Cabinet consisting of particular Minister which could meet on specified dates once in a week or once in a fortnight to take decisions on matters concerning two or more departments.

It was generally felt that for fuller utilization of irrigation facilities the Agriculture Department or the Directorate of Agriculture should have an Engineering Wing which could execute works up to a certain level to be determined by each State. Schemes requiring higher technical skill should go to the Public Works Department. It was unanimously felt that no such arrangement would be required in the Community Development agency. All irrigation works which do not require high technical skill should be executed by the Agriculture Department under the arrangement mentioned.

9.8. In States where there are special posts of Development Officers for various crops; these officers may work as deputies of the Extension specialists in Agronomy. The appointment of such deputies according to the Committee is justified only where a particular crop deserves special consideration in a State. This will need examination in the States (Category A).

States agreed to examine the suggestion in the light of local conditions.

10.1. The Committee has reiterated the recommendations made by the Joint Indo-American Team on Agricultural Research and Education that the total research programme is inadequate to meet the needs and demands for improved agricultural materials and practices. For increasing Agricultural production substantially, we have to rely more and more on improving the efficiency of production by evolving scientific methods.

Agreed.

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MAHAJAN

CATEGORY B: RECOMMENDATIONS HAVING MINOR FINANCIAL
IMPLICATIONS REQUIRING URGENT IMPLEMENTATION.

** * * * *

Paragraph Summary of
Reference recommendations.

Recommendations made by
the Conference of State
Officials.

2.12 The Committee has observed that in the State Departments of Agriculture there was only a handful of senior and competent officers and the gap between them and those who can take over after them is a disconcertingly wide one. There is an acute shortage of experienced agricultural officers with vision, initiative and drive.

Suggestions made by the Centre to implement this recommendation were accepted.

2.30 The Committee has suggested the creation of super-numerary posts so that the staff with requisite aptitude and competence in a special subject is continued in the same line without allowing their prospects of promotion to suffer.

Accepted as a very useful recommendation.

2.37 Service rules have not been revised to in some States for the last 25 years and in some States no recruitment rules exist except for a few senior posts. Nor is there any system of framing qualifications and method of recruitment. The Committee has for this purpose recommended that an experienced Administrative Officer from the Appointments Department should be placed on deputation with the Secretary, Agriculture, for drafting or revising rules of agricultural services.

Accepted.

3.1 The Committee has made important to recommendations for providing 3.9 different types of training to the existing staff as well as to the fresh agricultural graduates recruited in the Agriculture Departments. These training courses should be conducted by senior, experienced and competent officers and should be systematic and should operate in an automatic manner.

Accepted as a very useful suggestion except by the West Bengal representative who was not able to agree.

3.10 Regular supply of current literature to the departmental staff in order to keep them fully abreast of modern developments in the field of agriculture is very necessary.

Accepted. Recommendation was made that the Centre should also supply literature free of cost upto block level. The literature would be that which could be usefully utilised by officers and staff at that level and not big

books which are required for reference purposes. It was agreed that the States would improve the distribution arrangement so that literature received in the blocks is distributed speedily to the concerned staff, such as, V.L.W.s, Extension Officers, etc.

Accepted.

3.11. The Committee has laid special emphasis on providing adequate training in Farm Management and Farm Planning at 3 or 4 selected farms which should be under the control of a competent Farm Manager. This training course should be organised for the benefit of new entrants to the Extension Branch and is specially necessary at this stage when seed multiplication farms are being established in the country in large numbers. The Committee has also suggested that farm management courses should be organised at other institutions such as the agricultural colleges and schools etc.

2.13. The Committee has recommended the creation of training reserves so that regular departmental work does not suffer in the absence of personnel deputed for training. In all categories in Agriculture Department where there are particular subject, a training and deputation reserve has been recommended in addition to the normal leave reserve.

Accepted as essential, subject to financial implications being worked out by each state.

4.7 These paragraphs refer to a gross lack of coordination between the
to Irrigation and the Agriculture
4.8 Departments both at the level of planning and execution in the field. The Committee has indicated a Coordination Committee for Irrigation and Agriculture Departments and also posting of Agricultural Officers in the Irrigation Departments with the Superintending Engineers. The duty of these Agricultural Officers would be to serve as a liaison between the Agriculturists and the Irrigation Department. They will be technically under the Director of Agriculture. The Committee has further recommended that in all Departments of Agriculture should be taken into confidence and special Agricultural Officers should be attached for ensuring maximum utilisation of water.

Coordination between the Agriculture and Irrigation Departments was considered necessary for optimum utilisation of water available for irrigation purposes. It was thought, however, that instead of having a separate committee, the Cabinet Sub-Committee recommended by the Minister in the morning session, could attend to this function. It was agreed that a special irrigation officer would be required for liaison work with the Irrigation Officers but he should be under the control of Agriculture Department.

- 5.1 The Committee has recommended the formation of a small unit at the headquarters of the Director of Agriculture for the purpose of evaluating and assessing the progress of new extension recommendations, land development schemes and schemes for training and organisation of the farmers. Accepted. The nature and composition of the unit will have to be worked out by each State.
- 7.14. Organizational improvements such as the posting of an Internal Financial Adviser with powers to take decision in the State Departments of Agriculture should be undertaken. The Committee has specially emphasised the fact that these Advisers should have definite powers to take decisions on behalf of the Finance Department and should not be permitted to become an additional channel of approach to the Finance Department. The Committee agreed that this was a good suggestion and would be adopted by States where difficulties are now felt about financial control or where work load justifies the appointment of a separate Financial Adviser.
- 9.4. The minor Irrigation Branch of the Agricultural Department should be equipped to bore wells and sink tube-wells in suitable areas on behalf of the cooperative Societies and the individual farmers. Minor Irrigation Programme, including tubewells should not be handled by the P.W.D. as this Department cannot be expected to give as much importance to minor irrigation works as it does to its regular works of much bigger dimensions. The same holds good for the building programme in the agriculture sector of the plan. Accepted in principle but the level of the officers to be appointed would depend on the magnitude of the work in each State.
- The Committee has recommended the setting up of a Works Division within the Directorate of Agriculture under a qualified Joint Director with full powers of a Superintending Engineer so as to ensure speedy implementation of both minor irrigation and the building programmes within the agriculture sector. A research wing for agricultural implements and machinery should also be added to this sector.
- 9.5. Soil Conservation on agricultural lands should be the function of the State Agricultural Departments and in the Forest areas of the Forest Department and care should be taken to see that an independent department of soil Conservation does not spring up. The Committee has Agreed in principle.

recommended that subjects like land reclamation, minor irrigation including drainage and flood control (also refer to paragraph 9.3), and soil conservation should all be assigned to a single branch which may be designated as the land Development Wing or Branch of the Department of Agriculture. This Branch should also be responsible for popularising improved implements and agricultural machinery. The Committee has recommended that pending the recreation of the Land Development Wing, the responsibility for the execution of minor irrigation programme should be transferred from the District Agricultural Staff to the Engineering Staff in the Agriculture Department so that the District Agricultural staff can be left free to carry out its legitimate educational work.

9.9. There should be an administrative officer subordinate to the Director of Agriculture to relieve him of routine administration. This Officer should deal with all establishment cases and should be drawn from the State Civil Service. In Addition there should be Budget and Accounts Officer drawn from the State Finance and Accounts Service for relieving the Director from routine and accounts matters.

Accepted. But details to be worked out by the States.

9.10. A full time progress and evaluation Officer assisted by a small unit of the staff responsible for the collection of developmental and statistics on one hand and evaluation of programme on the other. This unit should keep in touch with the Departmental programme and keep them under continuous review and measure their success or otherwise in the field, so that any defects of execution or planning could be rectified. In States which had a senior Statistician attached to the Director of Agriculture, the Progress and Evaluation Officer could be placed under him.

Accepted.

9.18.

9.16.

The farm Advisory Service to be fully effective should be supported by an Agricultural Information Service consisting of trained staff of Information Officers specialising in mass communication methods. The Agricultural Information Service will be expected to prepare extension publications, leaflets, pamphlets charts, exhibits, visual aids which form an important plank in conveying agricultural information to the farmers. The Committee has recommended that agricultural information Units wherever mixed up with publicity and propaganda, should be separated and located in the Agricultural Departments and should be developed as soon as possible into full fledged Agricultural Information Bureaus. The Bureaus should be placed under the charge of an Information Officer who should be equal in rank to the head of the Department and he should have adequate staff, equipment and funds to effectively carry out his work.

Accepted with the clarification that Information Officer's rank should be that of a head of a Section as in the printed report.

10.4

The Agricultural College must remain in constant and vital touch with the farmers and their organisations and make teaching and research more practical and ensure a free flow of agricultural problems and results of research back and forth between the village and the research laboratories and farms. The teacher, the research worker, and the extension specialist should be teamed together and placed under the technical and administrative control of one and the same officer in each major field of agricultural science.

Accepted in principle and the States work towards this objective.

10.5.

In order to provide an effective link between the agricultural research and Education, the Committee has suggested the setting up of an Extension Section in the Agricultural Colleges under a Professor of Extension whose function will be to teach extension methods to the students so that they may develop into effective extension workers. The duties of the Extension Staff will be to develop appropriate technique to suit various situations and to organise research in extension methods.

Accepted.

10.6 The Committee has also recommended that Extension Specialists should be attached to all the main regional centres of Research.

Accepted. It was pointed out that the recommendation No. 10.6 was only the duplication of No. 105.

10.11 For bringing about close coordination between Research, Education and Extension Branches, the Committee has recommended that arrangements should be made for holding annual and half yearly Conference at the major Research Stations. This Conference should be attended by all officers connected with Research and Extension working in the Region. A similar meeting at the District level, for a day or two, once in 3 or 4 months may also be recommended.

Accepted.

10.13 The Committee has recommended that retired Specialists who have settled down in different parts of the Country should be utilised and associated with the supervision of local schemes and in Research Institutions. They could be given some honorarium to compensate for their out of pocket expenses.

Accepted.

Category C:

Recommendations having substantial financial implications and which should be implemented by the end of 1959.

Paragraph reference.

Summary of recommendations.

Recommendations made by the Conference of State Officials.

2.19

The Committee has pointed out that any thing from 30% to 80% of the posts in State Departments of Agriculture are still temporary. The pensionary rights of agricultural employees are adversely affected by the temporary nature of the posts not only in the State Departments of Agriculture but also in the I.C.A.R. & Commodity Committee schemes.

Accepted in principle. Implementation will depend on availability of funds.

2.20
to
2.25

The Committee has pointed out that the low scales of pay prevailing in the agricultural services do not attract good human material. In the opinion of the Committee, strong agricultural departments cannot be built unless this handicap is removed. There is a strong need, according to the Committee, for planning and distribution of national intellect and talent.

Accepted.

2.26
and
2.27

In order to provide opportunities for promotions to higher posts, the Committee has recommended the creation of selection grades with attractive grades of pay. The percentage of selection grade posts should also be as provided in the administrative services.

Accepted in principle. Efforts will be made to provide selection grade in regard to groups of posts where prospects of promotion are inadequate.

2.34
to
2.36

In the opinion of the Committee, nothing short of forming an All-India Agricultural Service, with scales of pay and prospects at par with the I.A.S., would raise the morale and efficiency of agricultural services and thereby attract equally suitable material for manning the services and bring about the uniformity of standard.

No recommendation was made in view of the views expressed by the Ministers in the morning against the formation of an All-India Services.

The difficulty of obtaining suitable officers for Union Territories was mentioned and the following suggestions were offered:

The Centre might organise a pool of officers exclusively for the Union Territories or as decided in the Eastern Zonal Council, the neighbouring states

would make special effort for providing the requirements of the Union Territories which meant that they will have to increase their deputation reserve for the specific purposes.

6.6

The Committee has observed that gradually and imperceptibly the propaganda or the extension branch of the Department of Agriculture was converted into a machinery for executing land development works and for distributing supplies such as fertilizers etc. The principal task of educating the farmers for adopting new methods of cultivation receded into the background and the concept of benefiting the farmer by supplying him the required materials or by carrying out the required land developments schemes came to be recognised as the principal task. As further pointed out by the Committee in paragraph 8.14, the time has come when the entire organisation for the supply of fertilizers, improved seed, insecticides and agricultural implements must be separated from the truly extension and technical functions of the Agriculture Departments and transferred/ to the Cooperative Organisations in the States.

/preferably

Accepted with the clarification that the agency to which the trading function should be transferred should be left to the States depending upon local conditions.

8.8

Adequate storage facilities for stocking fertilisers are also not available in the States and the number of distributing Centres are not sufficient to meet the requirements of the cultivators.

It was agreed that the storage facilities within the reach of farmers is inadequate. Cooperatives have also no adequate storage facilities. Funds would be required to build storage space and the matter will have to be looked into by the Ministry of Community Development.

8.9

The Committee has recommended that the State Departments of Agriculture should not involve themselves in the distribution of non-discript seed and should confine their attention only to the propagation on Government farms, of improved pedigree seeds of guaranteed purity, which has been inspected and rogued in the field prior to harvesting and threshing of the crops.

Accepted.

8.44

Supply functions of the agricultural departments.

Same as 6.6

9.6

At the headquarters of Director of Agriculture, the following organisation has been suggested by the Committee:-

Accepted in principle but each state will have to examine the details bearing in mind the suggestions made by the Committee.

(i) Joint Directors for looking after (a) Land Development and Works (see paragraphs 9.3 & 9.5) (b) Extension & (C) Research & Education.

(ii) A Deputy to the Joint Director for Research and Education in larger States.

(iii) Deputy to the Joint Director of Extension for looking after the large number of seed Farms which have already been opened. The Committee is of the view that all such farms together with other farms which the States might have would required expert knowledge and guidance of an Officer who will be a Deputy to the Joint Director for Extension. The Committee has further recommended that this officer should be fully responsible for the running of all the farms in the State and should operate on the budget of these institutions which should be centralised wherever found necessary.

9.7

The Joint Director of Extension should be supported by at least 4 Extension Specialists in Agronomy, Plant Protection, Soils and Soil Fertility, Horticulture and any other subjects depending upon local conditions. The Extension Specialists should formulate statewide plans for the extension of research findings and to remove technical difficulties encountered in their extension. These specialists should be drawn, from the Research Section and should work in close liaison with the Research Officers, so that the translation of the results of the research into field practices is not delayed. These extension or subject matter specialists, with training in extension

methods will constitute a Farm Advisory Service which should keep in close touch with agricultural research being done at the Central, State and Commodity Committee Research Stations and formulate authoritative recommendations on farm practices and techniques for use by the Agricultural Extension Officers of the Blocks. This organisation will also help in planning and organising crop campaigns.

The Committee has recommended that the training of young officers should be an important assignment for all the Joint Directors.

9.11

The Committee has recommended that the Extension Specialists at the Headquarters of Director of Agriculture should be supported by similar specialists at the District level. In States where the Extension programme is not well developed or where the districts are small, these specialists may serve a group of districts. The Committee has also suggested that for developing the programme relating to food-grains, oilseeds and pulses, it might be worthwhile to appoint special Extension Specialists at the District and the State level.

It was pointed out that all the posts required will have to be additional posts and the States could re-organise existing posts to work towards the objective stated adding the most essential extra posts.

V.0

9.13

The Committee has recommended that in larger districts, special sub-divisional Agricultural Officers may be provided in each Revenue sub-Division of a District rather than personal Assistant as in some States. The Committee is of the view that the appointment of Sub-Divisional Agricultural Officer is a better arrangement. The Committee has indicated that a Deputy Director can guide the agricultural work in about 100 to 125 blocks, and the District Agricultural Officers can guide the work of 3 to 4 Sub-Divisional Agricultural Officers, each of whom would look after about 10 to 12 blocks.

Accepted in principle. A further suggestion made by the representative of Madras Government that it would be better to divide a larger district into two districts was also considered feasible.

9.14

Till such time as the supply functions are transferred from the Agricultural Department it would be necessary according to the Committee, to provide gazetted personal Assistants together with the necessary complement of accounts and audit staff, both for the District Agricultural Officers and the Deputy Directors of Agriculture in order to relieve them of routine accounts, bills and supply work.

It was pointed out that the suggestion related to a temporary phase pending the transfer of trading functions to the cooperatives or other agencies. If the trading functions are transferred and the Department is provided with adequate extension subject-matter specialists as recommended earlier, D.A.O.s may have adequate time to attend to this type of work without separate staff for the purpose.

10.2

The Committee has recommended the establishment of major research stations for serving the needs of each agro-climatic region, equipment and staffed for undertaking research in all branches of agricultural improvement, such as plant breeding soil science, entomology, mycology, agronomy, horticulture etc. District Farms and sub-stations, and crop and irrigation research stations within the region should serve as sub-stations of the regional research stations. The Committee has further expressed itself in agreement with the recommendations made by the special officer (Dr. Ramiah) who, under the auspices of the I.C.A.R. made certain recommendations with regard to the reorganisation of research work on the rice crop. It would be useful if similar re-views are entrusted by the I.C.A.R. to Experts in the case of other crops so that the lacunae in crop research and its application to the field could be filled up.

The recommendation was accepted. Views were, however, expressed about growing tendency on the part of the Centre to encroach on state functions by establishing centrally controlled and staffed regional research stations and other institutions for performing work falling within the States' purview and sometimes already engaging the attention of the States.

It was pointed out on behalf of the Centre that Regional Research Stations dealt with work which did not fall within the sphere of any one particular state and hence had to be sponsored by the Centre because of inadequacy of States funds and personnel. It was agreed, however, that the administration of such institution should be with the State Government and their establishment should be in consultation with the States. It was agreed that the Government of India would look into the question in the light of the views expressed.

10.7

A separate section for carrying on research and teaching work in the field of Agricultural Economics has been recommended in the Agricultural Colleges and Research Institutions.

Accepted.

10.8
to
10.10

The Committee has recommended that there should be one vocational school of agriculture in each districts imparting practical training

Accepted.

in agriculture. The School should be adequately equipped with farms and other training facilities and may run 2 to 3 different types of courses. These schools should have a separate hostel for the farmers to reside during their training period. For the benefit of the practical farmers short courses ranging from two to ten weeks should be organised on growing special crops, poultry keeping, bee-keeping, horticulture, farm management and agricultural machinery depending upon the local demand.

10.12

To relieve the Research Workers in Colleges and Institutions of administrative and routine accounting duties, it is impreative that in all Agricultural Institutions, there should be properly trained administrative and accounts staff of appropriate staff.

Accepted.

TAHUNA.

CATEGORY D: RECOMMENDATION WITH FAR REACH FINANCIAL
IMPLICATIONS WITH NO TARGET DATE.
** * * * **

Paragraph Recommendations of the
Reference. Committee.

Recommendation made by the
Conference of the State
Officials.

8.15 The Committee is of the view that a programme which seeks to encourage the farmer to adopt better & improved methods of farming should be matched by a suitable credit programme, which will provide the necessary means for the adoption of the new methods advocated. Government policies should be moulded to the needs of the small cultivators and credit facilities extended to them despite the greater risk involved.

It was agreed that the matter should be examined by the C.D. Ministry. The view was expressed that for a successful programme more agricultural credit would have to be found.

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CATEGORY E. RECOMMENDATIONS OF THE AGRICULTURAL ADMINISTRATION
COMMITTEE, REQUIRING CENTRAL ACTION -
** * * * **

The Conference stated that the Centre should now initiate action with which the Government of India are concerned, in the light of the decisions taken with regard to recommendations falling within the purview of the State Government.

Financial resources for implementing the recommendations of the report.

It was agreed that the financial implications of the accepted recommendations of the report should be worked out by each State in the light of the decisions.

2. The States were emphatically of the view that the recommendations could not be implemented during the current year unless the Centre makes cent per cent grant. Further, even with cent per cent grant, the States could not implement the recommendations, if funds will have to be found from the State Plan provision as the provision has already been committed to most essential items of work which are being doled out from year to year by the Planning Commission. On a rough estimate it was thought that the annual expenditure to a particular state may not be more than 13 lakhs. It might be even less. On the whole Rs. 2 crores might be needed during the remaining period of the Second Five Year Plan. The Conference recommended that this entire fund should be provided by the Centre as a centrally sponsored scheme so that both the funds as well as the plan provision is provided by the Centre. The States, on their part, would agree to implement the recommendations, and regard that the expenditure is committed expenditure during the Third Five Year Plan so that the financial assistance from the centre would not be required during the Third Plan.

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APPENDIX

INAUGURAL ADDRESS BY SHRI A.P.JAIN, MINISTER, FOOD & AGRICULTURE AT THE CONFERENCE OF STATE AGRICULTURAL MINISTERS HELD ON 6TH FEBRUARY, 1959.

It is with great pleasure that I extend to this distinguished gathering a warm welcome. I wish to convey my appreciation and gratitude to all the State Ministers and other representatives who have been able to find time to be with us here.

2. We have almost established a procedure by now that whenever something important in the field of food production has to be considered, the State Ministers are consulted in a Conference so that I could take counsel with them and arrive at decisions with maximum unanimity. The present Conference has been convened primarily to consider the Report of the Agricultural Administration Committee which is a significant document having a direct bearing on our food production efforts. Those of you who were present at the Conference of State Ministers of Agriculture held in Srinagar in October, 1957, will recall that views were expressed about serious delays in the execution of agriculture production schemes in the States due to administrative complexities and over-centralization of powers, both administrative and financial. The Conference suggested to the Govt. of India to set up a Committee which should visit a few States and recommend for the consideration of the State Governments a model agricultural organisation in the States as well as measures for delegation of powers to agricultural officers at all levels so that the staff of every category are given responsibility with adequate authority for carrying out the programme of work entrusted to them. The Govt. of India accordingly appointed the Agricultural Administration Committee with Raja Surrender Singh as its Chairman. The Committee was formally established at the end of February, 1958 and it is commendable that it submitted its report by October. The committee's recommendations have been well received in the press and by the public and it is now for the State Governments to implement the accepted recommendations.

3. The Agriculture Secretary, the Director of Agriculture and the Registrar of Co-operative Societies in each State served as co-opted members with the Committee and the draft report of the Committee, before finalisation, was thoroughly discussed with State representatives

and their opinion and practical suggestions obtained. The recommendations of the Committee, therefore, are not new to most of the members who have assembled here and in fact they have played their part in shaping the recommendations.

4. I am given to understand that in the Group discussions held in Delhi during the past few months to discuss the State Plans for 1959-60, every State has made a token provision in its budget for expenditure relating to the implementation of this report. This is a step in the right direction because the accepted recommendations can be quickly implemented if additional funds could be reappropriated to augment this token provision.

5. This special Conference has been convened so that we could arrive at policy decisions on the important recommendations to enable the officials to work out details for speedy implementation.

6. We have already made a preliminary study of the recommendations & classified them under different categories which have been communicated to the State Governments in order to facilitate examination at their end. I take it that most of you present here would have conducted a similar review which can form the basis of our discussion for arriving at concrete conclusions. The recommendations fall particularly under two broad categories, viz., those which involve no financial implications and, therefore could be implemented without any delay, provided they are otherwise sound and acceptable. The other recommendations which involve financial implications might require a little more consideration particularly in regard to the sources from which the expenditure could be met. The recommendations having no financial implications relate mainly to procedural matters, delegation of powers to officers at different levels, simplification of budgetary procedures and expenditure sanction, framing of rules for the different posts, revision of service rules direct recruitment of officers in order to inject fresh blood, promotions based on merit, co-ordination of action between the irrigation, development and agricultural departments & in short, measures for gearing up agri. administration to meet the developing need of agri. production programmes. There is need to concentrate more on the man behind the plough than on paper. I am sure you will agree with me, that this is the time for the administration and staff to be thoroughly re-orientated to give first priority to an impact action programme for higher production.

7. The recommendations which involve additional expenditure to Govt.,

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relate, among other things, to the building up of key personnel,
removing of dead wood in the Departments, need for better service
conditions, provision of more opportunities for the staff of agri-
cultural departments, departmental tests with necessary
incentives for the staff to be in a
state of continuous preparation for better work, insti-

tution of training facilities for staff, proper programme
planning and separation of what are called the 'trading
functions' from scientific and educational work related to
farming. We have not been able to make any appraisal of the
expenditure that may be involved in the acceptance of some of the
salient recommendations of the Committee. No one will disagree
that a contented and competent staff is a pre-requisite for
a dynamic agricultural administration. At first sight, it
might appear that the acceptance of the recommendations of the
Committee in regard to service conditions would involve
substantial expenditure but it should not be forgotten that
with the improvement in service conditions, the output and
quality of work would improve and a fewer efficient and contented
persons may do more work than what many less-qualified and frustrated
persons are doing now. Moreover, it is not necessary that in
the higher scales recommended by the Committee all the existing
staff should be automatically fitted in. It follows, that in
the new scales officers should be appointed only if they have
the necessary competence to fill the higher posts. In other
words, there should be proper screening so that only those
who have the necessary qualifications, aptitude and competence
are given higher scales. It can also be expected that the
revised scales would attract suitable direct recruits who
should be prevented from falling into a state of routine
working and stagnation by prescribing periodical departmental
tests as a part of their conditions of service. If these
measures are adopted the actual expenditure involved in
bettering the service conditions in the agricultural departments
would not be so high as it would seem at first sight. Similarly,
we have made suggestions, how in each cadre selection grade
posts could be provided for appointment of really competent
officers on merit without increasing very much the cost of cadre.

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8. One of the important recommendations is for the establishment of an All-India Agricultural Service on the lines of the Service that existed in the past. You all know that in order to raise the morale of the staff and to get better type of personnel we have instituted an All-India Administrative Service. Efforts are being made with regard to the creation of All-India Services in some other fields. The formation of such a service will require the consent of the State Governments. It will also involve the pooling of posts, additional expenditure on account of the difference between the Central and State Service scales of pay and central control of the Service. If you are convinced about the merit of having an All-India Service with Officers who could be interchanged and who would acquire knowledge and experience of agricultural conditions on an All-India basis, then financial considerations should not stand in the way of the formation of such a service.

9. I would also like to draw your attention to another basic recommendation of the committee that the Agriculture Departments should be relieved of what are termed 'trading functions'. These functions should normally be discharged by the Co-operatives and wherever the co-operatives are not in a position to take them over immediately, work of this kind should be assigned to other non-technical staff, leaving the scientists and the agriculturists to do the technological and educational work. It is a waste of national talents, if the scientists and the technologists are diverted to administration and trading to the detriment of scientific functions. Technological improvements will have to play a positive role in our programme of food production if we desire to keep pace with the demands of food needed for the increasing population and higher standards of living. This would be possible if the scientific and the technological staff are given unstinted opportunity to utilise their talent, experience and knowledge in educating millions of farmers. If the staff of Agriculture Department is mobilised and made responsible for the Extension work on the lines suggested by the Committee, I am sure that the activities of our scientific and research

Contd....

institutions could be related more directly to food production and raising the farm output. I would request you to consider this part of the recommendation dispassionately and to suggest practical measures to ensure that scientific and technical personnel of the agriculture departments are utilised for the purpose for which they are trained.

10. I would now draw your attention to the second important item on our agenda, namely, the Kharif Production Drive. With your co-operation, the intensive Rabi Production Drive has proved a success. Although it was started a little late, the co-ordinated effort put in by the different agencies has given the assurance that we would look forward to a good Rabi harvest. Encouraged by this success, I have already addressed you forwarding the outline of a Kharif Production Campaign to be launched in all the States. I have no doubt that with proper advance Planning and co-operation of governmental departments, farmers and public men, it should be possible for us to achieve better results during the next Kharif. The need for raising our food production substantially is not an ideal based on sentiments but a hard, practical and over-riding necessity - a condition of our survival and a basic need for the fulfilment of our development plan.

11. No doubt our food production has increased considerably since the inception of the First Plan. Even so, it is a hard fact that this increased production, impressive as it is, is insufficient to meet the growing demands of the increasing population and rising standards of living. Every year we are adding six to seven millions of new mouths to feed and our extra requirement to meet this need alone comes to one million tons of food per year. Moreover, we have to produce more food in order to meet the needs for the rising standard of living. All this extra food must come from our existing acreage of cultivable land. Our yield per acre is one of the lowest in the world but with determination and concerted efforts it can be increased by twofold or even threefold. Everyone of you must

have observed that a progressive farmer produces sometimes as much as six to eight times of what a poor farmer does and given the means, advice and facilities there is no reason why the poorer farmer should not approach nearer to the progressive farmer in production. It is our aim to double our production. It is our aim to double our food production by the end of the Third Five-Year Plan.

12. The control of population is another problem facing us. We have made some efforts in that direction but, I am afraid, not enough. With the improvement of health and sanitation, luckily the death-rate has been going down but the birth-rate continues at the same old level. In the result, the rate of increase in population which at the last census was estimated at 1.25 per cent per year is now nearer to 2 per cent. The control of population, desirable as it is, is, however, full of difficulties and in the immediate future it does not offer itself as a major factor in the solution of our food problem. We must look for the solution through increased yield per acre. It is in this context that our production drive assumes special importance. I have already requested the States to prepare for the guidance of their workers a Kharif Campaign Guide, more or less on the model furnished by the Centre. The guide should indicate the different operations to be undertaken and the time schedule during which each of the operation should be completed. It should also take into account the available resources and manpower. I have no doubt that within the existing resources much greater progress could be achieved by gearing up departmental machinery for an impact programme of production. Proper co-ordination between the different Ministries and agencies, particularly irrigation, development and agriculture, should be achieved. Departmental bottlenecks experienced during the Rabi production drive, particularly in the matter of sanctioning agricultural credit and supplying the means of production to the farmers should be carefully studied and overcome.

13. The major crops included in Kharif campaign are paddy,

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jowar, maize, bajra and ragi. The States are free to add any other crop depending on its importance in the State. Paddy, however, is our principal crop which accounts for about half the total production of food-grains in the country. Special attention will, therefore, have to be paid for raising rice production.

While all the paddy-growing States have thus a special responsibility, four States particularly viz., Orissa, Bihar, Uttar Pradesh and Madhya Pradesh, which claim about half the paddy acreage in India, will have to play a major role. It is in these States we have the lowest yields of about 500-600 lbs. of rice per acre. If the yields in these States are raised to the level of yields in some of the States like Andhra or Punjab, we may have no problems about rice. These States will, therefore, have to make a special study of the factors responsible for such low yields and intensify the measures to remedy them. Suggestions have been made that if line sowing instead of broadcasting is adopted on a large scale and if the paddy varieties grown are reduced to a few improved ones and if short-term high yielding varieties are extended to larger areas, the average yields could be substantially increased.

14. Nitrogenous fertilisers will have to play an important part in raising our yields, particularly with regard to paddy. Unfortunately, this fertiliser is in short supply. We are making every effort to see that the available fertilisers are transported to the rail-heads between April and June so that the fertiliser allotted to States is supplied in time. The States, in turn, will have to arrange supply-points for the timely distribution of the available fertilisers within easy reach of the farmer. In the context of our shortage of chemical fertilisers, improvement of soil fertility through other measures deserves the highest priority. This may be done by a vigorous drive with regard to green manure and compost making. A number of suggestions have been made in the guide about the practices which may be followed and I would request the

State Governments to give serious attention to these two measures which, if adopted on a large scale, could increase our production considerably.

15. We have been able during the current year to increase the allocation for minor irrigation. The original outlay of 16.6 crores was subsequently increased to 20 crores. In the Development plans for 1959-60 which have recently been discussed with the State representatives, an outlay of about Rs.22 crores has been agreed to for minor irrigation schemes. I hope this larger allocation will help in our efforts to increase agricultural production. It is needless for me to emphasise the importance of maintaining and fuller utilization of the completed works while we are taking up new irrigation. I am glad that some of the State Governments have already passed legislation empowering them to carry out the construction of field channels for taking water to the farmers' fields and recover the expenditure from the beneficiaries. I would urge that other States also may pass such legislation soon.

16. With the reduction of tubewell water rates and the construction of proper channels, there has been considerable improvement during 1958 in the utilisation of tubewell water for irrigation in a number of States. For optimum utilisation, however, it is essential that suitable crop patterns are evolved and introduced in areas commanded by tubewells. The groundwater exploration project, under which exploratory drillings are being made in certain areas, has so far shown that there are great possibilities of tubewell construction in Madhya Pradesh, Madras, Andhra Pradesh, Orissa and West Bengal. I hope, the State Governments will take advantage of the results obtained under this project.

17. The success of our production drive will depend upon the effort put in by the farmer. China is reported to have achieved phenomenal rise in production primarily through the mobilisation of the human effort on a mass scale. In our country too unless the millions of farmers, who are responsible for production are geared to the need for stepping up production, the achievement

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would still lag behind. Some of the States like Uttar Pradesh have undertaken a training programme of farmers in 'Gramsahayak Camps'. The training of farmers on a mass scale could be adopted with advantage, by the other States. Such training should be systematic and directly related to improved agricultural practices, manuring, plant protection methods, use of improved implements etc. They should be arranged for a few days before each important field operation so that the techniques learnt in the camps could be subsequently practised by the farmers on the field. Our aim should be to bring simultaneously to such camps thousands and thousands of farmers. Sporadic efforts will not achieve results. While the field Extension staff in each Block should arrange such camps, the scientific staff of the Agriculture Department, Research Stations, Agriculture Colleges should be mobilized to speak and demonstrate to the farmers better farming techniques.

18. We have some recent experience of the benefits which accrued by mobilizing the scientific staff during the Rabi campaign. The time has come that our research workers should leave the ivory-towers in which they are working and concern themselves with the field problems directly related to production. They must be associated directly with the farmer in order to understand his problems and the conditions under which he is working. We should take measures to see that all our scientific workers whether employed in the departments of Agriculture, Agricultural Colleges, Research Institutions or experimental stations, are mobilized during the Kharif campaign to go to the villages, stay with the farmers and help them through demonstrations and advice to adopt improved agricultural practices. Our farmers are not conservative. If they are convinced about any improved practice, they would readily adopt it. It is the system under which we are working that is responsible for the failure to reach the results of research to the door-steps of the farmers. I would request the State Ministers to bring

the research and scientific staff on the farm which will give them an opportunity of understanding field conditions and adjusting their own research to the needs of the farmer.

19. The co-operation of public men and non-official agencies should invariably be invited as they are in a position to stimulate the farmers and to bring home to them the need for increasing production. While the scientist would demonstrate to the farmers improved practice, the people's representatives who are in living contact with the farmer, would create the necessary back-ground and conditions under which technological improvements could be readily adopted by the farmer. These agencies could do much to convey to the farmer the need for self help and to depend to a large extent on his own resources. There are many fields in which self-help programmes could be practiced such as the exchange of seed amongst the farmers, treating the seed against seed-borne diseases, maintaining compost pits to increase local manurial resources, adopting plant protection measures, cleaning and maintenance of irrigation channels, wells and tanks and other minor irrigation works and the fighting of crop pests like rats. Participation from all such agencies which could supplement governmental efforts should, therefore, be welcomed and encouraged.

20. I would appeal to the Ministers of Agriculture to see that in each successive production programme we achieve more than what was achieved during the previous season. We have already announced sufficient incentives by way of crop competition schemes and community awards for increasing production. The community awards will be directly related to the percentage increase in the total production of food crops. All those districts or States where the total production of food-grains exceeds 15% or more over the average of the past three years will qualify for the award. Each district which is entitled to the award will receive Rs.10,000 and each State Rs.50,000. The community awards could be spent by the State Governments for a purpose which will fulfil the community needs in areas

which have contributed most to raise the production. In each State the highest producing district would also be awarded the "Rajya Kalash" and the State achieving the highest increase in the production in the country will be awarded an all-India "Rashtra Kalash". I would request the State Governments to give the awards widest publicity.

21. Before I conclude, let me say a word of welcome to the members of the Ford Foundation Study Team on food production who are present here today. These members are top-level specialists in different agricultural subjects such as farm management, prices, land economics, land tenure, communications, supplies, credit cooperatives, extension, organisation and methods of training, community development, seed multiplication, Soil and water conservation, water utilisation, rice and wheat production, agricultural demonstration and evaluation. The Ford Foundation, in consultation with us, has been good enough to bring this high-powered team to India to study our production problems and to make suggestions for an intensive agricultural effort during the next few years. These are specialists who have the experience of helping their country to achieve high levels of agricultural production. I am sure they will be in a position to examine our production programmes, study our agricultural problems with a fresh mind and make practical suggestions which we could adopt for raising our own production. I trust that you will give them all the cooperation needed to make their mission a success.

Thank you,

OILSEEDS

1. The problem and its special feature.

The disquieting feature of the problem is that the production trend in some of the important oilseeds growing States is downward, as would be seen from the following table:

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Name of State	Acreage			PRODUCTION			Target fixed at Mussoorie (000 tons)	Addl. Prodn. target (Col. 8-5) (000 tons)	Pre-sent gap (Col. 8-7) (000 tons)
	55-56 (000 acres)	56-57	57-58	55-56	56-57	57-58			
Andhra Pradesh	4666	4733	4650	1188	1251	1099	1550	362	451
Bihar	504	390	352	56	29	36	115	59	79
Bombay	6215	6370	7337	1202	1292	1413	1500	298	87
Madhya Pradesh	3509	3737	3104	454	453	352	700	246	348
Madras	2170	2185	2185	870	904	911	1100	230	189
Mysore	2493	2364	2548	503	630	667	700	197	33
Orissa	527	514	514	65	64	64	90	25	26
Punjab	899	945	962	149	159	170	185	36	15
Rajasthan	1995	2389	2231	252	284	211	244 (-)	8	33
U.P.	6042	6051	5768	756	967	851	1180	424	329
West Bengal	342	333	261	49	38	36	70	21	34
Total	29362	30011	29912	5544	6071	5810	7434	1906	1624

The above statement shows the following trends:-

- (i) The progress made in the direction of the attainment of the targets fixed at Mussoorie is fairly satisfactory in the case of Bombay, Mysore, Punjab and Madras.
- (ii) The position with regard to production has deteriorated considerably in Andhra Pradesh, Bihar, Madhya Pradesh, West Bengal and Rajasthan.
- (iii) Production of oilseeds has remained almost stagnant in Orissa.
- (iv) In U.P., although some progress has been made, there is still a wide gap between the production and target figures.

2. Decreasing yields.

All-India Yield Per Acre

<u>Year</u>	<u>Quantity</u>
1953-54	724 lbs
1954-55	683 lbs
1955-56	677 lbs
1956-57	699 lbs
1957-58	662 lbs

Reasons for decreasing yield are said to be:

- (a) Want of improved seed;
- (b) Lack of manuring;
- (c) Insufficiency of soil moisture;
- (d) Damage by pests and diseases;
- (e) Lack of proper rotation;
- (f) Lack of adequate irrigation.

3. The gap between the targeted figure of 75.5 lakh tons in 1960-61 and production last known (59 lakh tons) is of the order of 16.5 lakh tons. This has to be made up in the remaining two years of the Plan i.e., current year of 1959-60 and next year 1960-61.

Groundnut accounts for about 72 per cent of the total oilseed production and nearly 50 per cent of the acreage. Therefore, largest concentration has to be on groundnut and to some extent on castor, both of which have good export markets.

4. Measures.

- (a) Extension of area: According to the figures available from States, about 2 lakh* acres of fallow and waste land can be brought under this cultivation yielding an additional production of 46,600 tons.

*Details
Appendi

For example, there is a Majuli riverain island in Assam which could grow a lot of rape mustard.

- (b) Irrigation: This is dependent upon the area served by the river valley projects; but minor irrigation, particularly in the summer-irrigated areas of Tanjore, etc., covering about 1.25 lakh acres could substantially help. All that is required is deepening of the existing wells to a depth of about 20 feet and insertion of R.C.C. rings. Attention of the Madras Government should be invited to this.
- (c) Fertilizers: A note has been sent to the Ministry of Commerce & Industry. On the basis of an optimum dose for an area of about 47 lakh acres (15 per cent of the total acreage), the requirement of fertilizers is as follows:

	<u>Name of fertilizer</u>	<u>Quantity required</u>	<u>Rate per ton (in rupees)</u>	<u>Value (in rupees)</u>
Statewise details Appendix II	Ammonium sulphate	1,61,789	230	3,72,11,470
	Superphosphate	1,83,490	260	4,77,07,400
	Potash	39,915	285	1,13,75,775
		-----		-----
		3,85,194		9,62,94,645
		-----		-----

Extra yield expected is about 2 lakh tons.

Out of the total value of Rs.9.6 crores, about Rs.4.8 crores would be required by way of foreign exchange for ammonium sulphate and potash.

It is for consideration whether a very high priority should not be given to the supply of fertilizers to the oilseed crops, specially groundnut and castor, from the existing supplies if the foreign exchange cannot become available as is generally known to be the position. It would also be necessary for the States to grant short-term loans for the purchase of fertilizers, as they do in the case of cotton, jute, etc.

- (d) Pesticides: We are aiming at providing pesticides to cover 6.25 lakh acres at Rs. 5/- per acre. The total cost on this account comes to Rs. 32.5 lakhs.
- (e) Pre-sowing treatment of the seed with 'Ceresan' or 'Agrosan' is recommended particularly in the case of groundnut, as a prophylactic measure.
- (f) Improved seed: At present, the acreage under improved seed is very nominal. We should aim at bringing 1/3rd of the total acreage i.e., about 1 crore acres under improved seed in the year 1959-60. This could yield an extra production of about 3.5 lakh tons.

The following improved varieties are available:

	<u>State</u>	<u>Improved variety</u>	<u>Yield p.a.(lbs)</u>
<u>Groundnut</u>			
	Bombay	Spanish Improved	1500
		Kopergaon 1 & 3	1200
		AK - 12 and 24	1100
		AK - 10	1000 to 1200
		AK - 8 and 11	1000 to 1200
	Madras	TMV - 1	1500
		TMV - 2	1000
		TMV - 3	1400
		TMV - 4	1400
	Mysore	HG - 10	900
	Punjab	Punjab Groundnut No.1	1500
	U.P.	Type No. 25 ♂	1200 - 1500
		Type No. 100 ♂	

<u>State</u>	<u>Improved varieties</u>	<u>Yield p.a. (lbs)</u>
<u>Caster</u>		
Bombay	No.20	875
Madras	TMV 1 to 3	750
U.P.	Type - 3	1000
<u>Linseed</u>		
U.P.	Type No. 1	1200
Bihar	Teesi	1500

It has to be enquired from the State Departments of Agriculture whether these seeds in the required quantities would be available. A total of about 2.2 lakh tons* of improved seed will be required of which the majority will be for groundnut i.e., nearly 2 lakh tons. The cost involved will have to be worked out with the State Departments.

*Statewise details Appendix

We have recommended a scheme for seed subsidy for groundnut. The matter is under consideration with the Ministry of Finance. In brief, this scheme provides for 20 per cent premium being paid for the collection of improved seed, subject to a maximum of Rs. 3/- per maund.

- (g) Double-cropping: There is considerable scope for double cropping in States like Andhra Pradesh, Bombay and Madras, specially immediately after paddy when there is still moisture in the soil. According to figures received from the State Governments about 78,000 tons** of extra production could be achieved by this measure.

**State-wise details Appendix I

- (h) Inter-cropping: About 35,000 tons** could be achieved according to figures from State Governments.

5. If all the above measures are adopted an extra yield of about 8.1 lakh tons could be obtained as follows, from the information at present available:-

	<u>Thousands</u>
Ext. of area	46.6
Irrigated	11.5
Double-cropping	78.0
Inter-cropping	35.0
Fertilized	205.2
Improved seed	354.0
P.P.	73.0
Crop.Comp.	12.0

Oilseed extension and oilseed development schemes are in operation in most of the oilseed growing States. It is for the States to make the maximum use of these facilities.

There are also 10 schemes of seed multiplication and distribution in the States of Andhra Pradesh, Assam, Madras, M.P., Mysore, Punjab and West Bengal. The State Governments should intensify the work on these schemes. If any further assistance is required, they should let us and the Indian Central Oilseeds Committee know.

The State Seed Farms should be geared up for the multiplication of improved seed.

As far as castor is concerned there is considerable scope by extending its cultivation on bunds, canal banks on the border of sugarcane, turmeric, chillies crops, etc.

6. Each State should have a Supervisory Oilseeds Committee which should plan and review the progress of production of oilseeds against targets every two or three months.

7. Pointed attention of M.P. and Rajasthan be drawn to the fact that their average yields are the lowest in the country. Average all-India yield is above 500 lbs per acre. The yield in M.P. and Rajasthan is 224 lbs and 203 lbs per acre respectively. Therefore, special efforts are required in these two States which have a total of 53 lakh acres under oilseeds.

(J.S.BALI)
Dy. Secretary to the Govt. of India

1954-55	12,000	8,000	17,000	1,112	12,100	8,100
Total:	2,01,700	46,604	1,98,346	77,512	98,700	34,858

Information from other States is awaited.

Statement showing the details of the expansion of area through (i) reclamation of waste and fallow land (including growing of Castor), (ii) double-cropping and (iii) inter-cropping as intimated by the States and additional production therefrom.

.....

Name of the State	Reclamation of waste & fallow land (including growing of Castor)		Double cropping		Inter-cropping	
	Acres	Tons	Acres	Tons	Acres	Tons
Andhra Pradesh	1,900	153	30,000	30,000	40,000	5,714
Bombay	1,68,000	39,665				
Madras	7,000	1,750	1,21,000	40,100	36,000	4,050
Punjab	5,250	1,500				
Uttar Pradesh					3,600	21,985
Orissa	19,550	3,536	47,346	7,412	19,100	3,109
Total:	2,01,700	46,604	1,98,346	77,512	98,700	34,858

Information from other States is awaited.

AM-11

STATEMENT SHOWING THE (i) ACREAGE PROPOSED TO BE MANURED (ii)
ADDITIONAL PRODUCTION THEREFROM AND (iii) OPTIMUM FERTILIZER DOSAGE

....

	Groundnut		Rape-Mustard		Castor		Linseed		Sesamum		Total	
	Acres	Tons	Acres	Tons	Acres	Tons	Acres	Tons	Acres	Tons	Acres	Tons
1. Andhra Pradesh.	5,25,000	33,812	-	-	-	-	-	-	-	-	5,25,000	33,812
2. Assam.	-	-	7,000	400	-	-	-	-	-	-	7,000	400
3. Bihar.	-	-	6,96,900	14,000	-	-	3,95,300	6,000	-	-	10,92,200	20,000
4. Bombay.	4,05,000	15,000	-	-	-	-	-	-	-	-	4,05,000	15,000
5. Jammu & Kashmir	-	-	34,600	1,500	-	-	26,250	750	-	-	60,850	2,250
6. Kerala	49,000	4,000	-	-	-	-	-	-	-	-	49,000	4,000
7. Madras.	3,38,000	31,250	-	-	-	-	-	-	-	-	3,38,000	31,250
8. Madhya Pradesh.	8,76,500	45,000	-	-	-	-	-	-	-	-	8,76,500	45,000
9. Mysore.	2,03,600	10,000	-	-	-	-	-	-	-	-	2,03,600	10,000
10. Orissa.	37,300	2,000	9,600	300	4,300	54	25,200	450	52,300	700	1,28,700	3,504
11. Punjab.	47,250	2,530	1,69,000	8,950	-	-	3,400	170	-	-	2,19,650	11,650
12. Rajasthan	74,600	5,000	8,000	250	-	-	-	-	-	-	82,600	5,250
13. Uttar Pradesh.	49,570	4,957	5,08,360	12,709	-	-	47,700	1,590	26,680	1,334	6,32,310	20,250
14. West Bengal.	-	-	20,800	800	-	-	-	-	-	-	20,800	800
15. Himachal Pradesh.	-	-	6,720	150	-	-	-	-	-	-	6,720	150
16. Tripura.	-	-	16,800	750	-	-	-	-	37,400	750	54,200	1,500
Total:-	26,05,820	1,53,549	14,77,780	39,809	4,300	54	4,97,850	8,960	1,16,380	2,784	47,02,130	2,05,156

OPTIMUM FERTILIZER DOSE

Groundnut											
Northern Region (Acreage - 10,85,000)						Southern Region (Acreage 15,20,600)					
Irrigated area			Rainfed area			Irrigated area			Rainfed area		
Ammonium	Superphosphate	Sulphate	Ammonium	Super-phosphate	Sulphate	Ammonium	Super-phosphate	Potash	Ammonium	Super-phosphate	Potash

Dose
(in lbs.)
per acre.

84	168	56	112	84	168	84	56	112	56	100	50
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Statement showing requirements of improved seed
Crop-wise

Appendix III

Groundnut		Rape & Mustard		Castor		Linseed		Sesamum	
Acreage	Seed Requirements (tons).	Acreage	Seed Requirement (tons)	Acreage	Seed requirement (tons)	Acreage	Seed Requirement (tons)	Acreage	Seed Requirement (tons)
1. Andhra Pradesh.	8,94,500 47,121	-	-	5,68,432	3,806	-	-	8,000	18
2. Assam.	-	2,24,000	500	-	-	-	-	-	-
3. Bihar.	-	8,14,500	1,818	-	-	6,58,800	2,941	-	-
4. Bombay.	4,37,000 23,021	-	-	-	-	-	-	-	-
5. Jammu & Kashmir.	-	22,800	51	-	-	17,500	78	-	-
6. Kerala	49,000 2,581	-	-	-	-	-	-	-	-
7. Madras.	1,08,000 5,689	-	-	30,000	201	-	-	50,000	112
8. Madhya Pradesh.	17,53,000 92,345	-	-	-	-	17,23,100	7,692	1,86,100	415
9. Mysore.	1,01,800 5,363	-	-	-	-	-	-	-	-
10. Orissa.	1,20,600 6,353	51,200	115	14,500	97	84,000	375	2,38,900	533
11. Punjab.	1,29,000 6,796	84,000	188	-	-	11,250	50	-	-
12. Rajasthan	9,000 474	6,400	14	-	-	-	-	-	-
13. Uttar Pradesh	1,79,697 9,466	13,79,542	3,079	-	-	58,736	262	1,43,514	320
14. West Bengal	-	70,000	156	-	-	-	-	-	-
15. Himachal Pradesh	-	33,152	74	-	-	-	-	-	-
16. Tripura.	-	14,400	32	-	-	-	-	25,400	57
Total	37,81,597 1,99,209	26,99,994	6,027	6,12,932	4,104	25,53,386	11,398	651,914	1,2455
(1) Seed-Rate	118 lbs (pods)	5 lbs.		= 15 lbs.		10 lbs.		5 lbs.	
(2) Total Seed required: (in tons)	1,99,209	6,027		4,105		11,400		1,455	= 2,22,196

NUM FERTILIZER DOSE

Southern Region (Acreage 15,20,600)						Other crops (Acreage 20,92,000)	
Irrigated area			Rainfed area			Ammonium Sulphate	Superphosphate
Ammonium phosphate	Super-phosphate	Potash	Ammonium Sulphate	Super-phosphate	Potash		

84	168	84	56	112	56	100	50
----	-----	----	----	-----	----	-----	----

7/2/1959
VIII 3

Proceedings of the Conference of the State
Officials held on the 7th February, 1959
(Morning Session: 10.30 A.M.)

....

The scheme for the Kharif Production drive, 1959 already circulated was taken up for consideration. The following important items were discussed:-

A. Supply of Improved Seed:- The State representatives were requested to indicate their requirements of improved seeds of crops included in the Kharif campaign. It was emphasised at the very outset that the acreage under improved seed should not go down as compared to the previous years, for want of advance planning in regard to procurement of seeds, specially paddy. It was pointed out by the State representatives that paddy being a localised crop, its seed requirement from outside the State may not be large. The requirements indicated by some of the states are mentioned below:-

State	Paddy	Maize	Bajra	State from where to be procured:
1) Madhya Pradesh	5000 maunds (N22)	-	-	Uttar Pradesh
2) Punjab	-	-	2000 mds	Rajasthan
3) Rajasthan	10,000 mds (Basmati)	-	-	Punjab
4) Himachal Pradesh	-	500 maunds (Hybrid maize; US13 or NC37)	-	Uttar Pradesh
5) Bihar	-	500 mds. (Hybrid maize)	-	Punjab

B: Plant Protection measures including seed treatment

In view of the importance attached to the adoption of plant protection measures during the next Kharif campaign, the State representatives laid stress on the timely supply of insecticides and pesticides as well as equipments such as sprayers and dusters. It was pointed out that there will

be no difficulty with regard to the supply of insecticides and pesticides. However, in view of the increased demand for sprayers and dusters (including power sprayers) over and above the quantities stocked with the State Governments and the Central Plant Protection Units, it was indicated that efforts will be made to arrange licence for the import of these equipments. The specific requirements for the equipments and insecticides, indicated by the State Governments are as follows:

State	Insecticides	Equipment	Foreign exchange required
Andhra Pradesh	75 tons of sulphur	-	-
Uttar Pradesh	-	2600 dusters	-
Mysore	1. Agrosan GN 62000 lbs. 2. Sulphur 10 tons	200 power sprayers	Rs.5 lakhs
Madras	--	Sprayers	Rs.2 lakhs
Punjab	-	2000 hand dusters	-
Bombay	--	4000 sprayers	15 lakhs
Jammu & Kashmir	10 tons of ceresan	-	-

The Uttar Pradesh representative pointed out that paddy blast not being a serious disease in the State they propose to take up seed treatment only as a demonstration. To start with, 200 to 400 mands of seed will be treated in each district. West Bengal on the other hand proposed to treat 20 percent of their entire quantity of pedigree seed before it is supplied to the cultivators. The State representative indicated that an additional requirement of dusters and sprayers worth Rs. 3 lakhs, over and above the provision of Rs.7 lakhs made in the State plan during the next year. It was pointed out that efforts will be made to provide equipments

propose to continue free treatment of seed during the next Kharif season also. For this purpose, they requested the Centre to subsidise the cost incurred by the State Government to the extent of 50 percent, which was agreed to. The aerial spraying of crops tried during the current ~~financial~~ ~~Rabi~~ Campaign in Bombay had proved a success and the State representative suggested the continuance of this programme during the next Kharif drive with Central assistance. The representatives from Jammu & Kashmir and Andhra pointed to the serious damage caused by maize caterpillar and Deccan grass-hoppers respectively, and wanted Central assistance in taking remedial measures on an extensive scale.

C. Requirement of iron & steel. In view of the pressing demand from the States for iron and steel, particularly in the context of the present production campaigns, it was indicated that a decision has been taken to allot hundred percent additional quota of iron and

steel over and above the normal allocation for each State. It was, however, made clear that this additional quota should be utilised exclusively for the purpose of the next Kharif campaign. It was also decided that a meeting of representatives of the State Governments who are experiencing difficulty in the procurement of iron and steel will be arranged with the Iron & Steel Controller in the near future so that the bottlenecks could be speedily removed. At the meeting which will be held in Calcutta a procedure will be evolved for obtaining the allocated quantities of iron and steel in time for manufacturing implements instead of allocations remaining only on paper as hitherto

D) Green Manuring: The State representatives were requested to pay special attention to the programme of green manuring during the next Kharif drive. The representative from U.P. pointed out that they proposed to cover 10 million acres of monsoon fallow with green manure (Sanaï, Moong & Dhaincha) during the next Kharif season. While the State does not require any seed of Moong and Dhaincha, the demand for 4,000 tons of sanaï seed was made by the State representative. Andhra Pradesh agreed to supply two to three thousand mds. of sanaï seed to U.P. The U.P. representative was asked to get in touch with the Andhra Pradesh Government for procurement of this quantity of seed. Punjab, on the other hand, needs 2,000 mds. of dhaincha seed, which Bihar promised to supply. The representative from Madhya Pradesh laid stress on the scope for green leaf manuring, specially in areas adjoining forests. He pointed out that they had already covered 3,000 acres during the last year, and will continue to intensify the programme during the next season.

Dr. Ramiah suggested that some of the plants like *Xanthium Strumarium*, *Croton Sparsiflorus* and *Cassia Torea* which was found all over the country could profitably be used for green manuring on a large scale by the different States.

E) Fertilisers: It was pointed by the Centre that the quota of nitrogenous fertilizer allotted for the quarter ending March, will be supplied to the State Governments before the end of May, 1959. In addition, an effort will be made to supply 40-45% of the quota allotted for the quarter ending June 1959, by the end of May. The additional allocations for the two months of April-May are indicated below:

State	Ammonium sulphate	Urea
	(tons)	(tons)
Andhra Pradesh	22,000	6,100
Assam	1,200	150
Bihar	8,000	1,500
Bombay	22,450	8,100
Delhi	120	20

	: 5 :	
Himachal Pradesh	200	-
Jammu & Kashmir	270	-
Kerala	2,000	450
Madhya Pradesh	60,000	750
Madras	4,400	1,462
Manipur	20	20
Mysore	4,800	3,000
Orissa	4,000	375
Pondichery	330	-
Punjab	2,400	-
Rajasthan	400	185
Uttar Pradesh	20,000	1,800
West Bengal	4,000	2,250

F) Agricultural Credit: The State representatives were asked to indicate their additional requirements of short term loans for purposes connected with the Kharif production campaign. The requirements are as under:

State	Short term loan (in lakhs)
Andhra Pradesh	Rs. 13
Assam	40
Rajasthan	(To be intimated later)
Uttar Pradesh	55 (excluding loan for fertiliser)
Mysore	160
West Bengal	(to be intimated later)

It was pointed out that an effort will be made to meet these additional requirements in full.

It was unanimously felt that the success of any production drive will depend upon two factors which should receive increasing attention: (i) the supply of the full requirement of chemical fertilisers and (ii) provision of a suitable price incentive. While appreciating the efforts made by the Centre in trying to procure more and more chemical fertilizers in spite of serious shortage of foreign exchange, the State representatives felt unanimously that particularly in production drives relating to Kharif, it would be meaningless to exhort the farmers to

produce more without giving them the most important means of production viz., fertilisers. They urged, therefore, that the Ministers' conference should pass a resolution on the serious position of the fertilisers and the need for making still greater efforts for fulfilling the entire requirements needed for production. The need for advance planning in this regard, taking into account the continuous increased demand for fertiliser and not only the past allocations which have been reduced from year to year, was emphasised. Further, it was pointed out that in view of increasing demand of foodgrains on account of rise in population as well as of standards of living, the Rabi and Kharif production Drives, would be a continuous feature. While we could mobilise various sources for a crash programme with regard to a particular season, such continued production drives would require long-term planning to meet the full requirements of the farmer. No farmer would produce more unless he is assured of a reasonable price as more production and less price will not be an incentive for the farmer to produce more. The need for announcing proper prices much in advance of sowing with regard to the crops selected for production drives, was strongly emphasised.

Feb 17, 1958

The Conference of State Ministers feels that one of the important measures for increasing production and maintaining it at a high level is to provide a fair price to the producer. The Conference wishes to recall a resolution passed in this regard while considering the report of the Grow More Food Enquiry Committee and requests the Government of India to take adequate steps to assure a fair price to the producer.

Feb 2, 1958

The Conference of the State Ministers of Agriculture, fully realising the important role of chemical fertilisers in increasing the food production, notes with satisfaction the increasing use of fertilisers by the farmers and while appreciating the efforts of the Central Government, despite the foreign exchange difficulties in importing large quantities of fertilisers, wishes to draw the attention of the Centre to importing more fertilisers. The Conference hopes that the Central Government will make every effort to meet the growing needs of fertilisers by direct purchase, barter or other arrangements from abroad until such time as fertilisers are produced inside the country in adequate quantities.

*Minister
copy*
II.

GOVERNMENT OF INDIA
MINISTRY OF FOOD AND AGRICULTURE
(DEPARTMENT OF AGRICULTURE)

Summary Record of the Conference of
Central and State Ministers of
Agriculture, held at New
Delhi on 6th & 7th
February, 1959.

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II. Speech by Shri K.B. Lall, Additional Secretary, Ministry of Commerce and Industry, regarding measures for increasing Oil seeds production.	

*

CONFERENCE OF THE
STATE MINISTERS OF AGRICULTURE

.....

Present:

Government of India

1. Shri A.P.Jain,
Union Minister for Food & Agriculture.
2. Shri V.T. Krishnamachari,
Vice-Chairman, Planning Commission.
3. Shri S.K. Dey, Minister for Community Development
& Cooperation.
4. Dr. P.S. Deshmukh,
Union Minister for Agriculture.
5. Shri Shriman Narayan, Member, Planning Commission.
6. Shri M.V. Krishnappa,
Union Deputy Minister for Agriculture.

STATES.

1. Shri P. Thimma Reddy,
Minister for Agriculture, Andhra.
2. Shri Moinul Haque Choudhry,
Minister for Agriculture, Assam.
3. Shri Bir Chand Patel,
Minister for Agriculture, Bihar.
4. Shri V.P. Naik,
Minister for Agriculture, Bombay.
5. Dr. K.N. Katju, Chief Minister, Madhya Pradesh.
6. Shri M. Baktavatsalam, Minister for Home &
Agriculture, Madras.
7. Shri K.F. Patil,
Minister for Agriculture, Mysore.
8. Shri Radha Nath Rath, Development Minister, Orissa.
9. Shri Nathu Ram Mirdha,
Minister for Agriculture, Rajasthan.
10. Shri M.L. Gaudan,
Minister for Agriculture, Uttar Pradesh.
11. Dr. R. Ahmed, Minister for Agriculture & Animal
Husbandry, West Bengal.

and other representatives/Officers of the
State and Central Governments.

CONFERENCE OF STATE MINISTERS
OF AGRICULTURE.

(Plenary Session 6th February, 1959-
10 A.M. to 1.30 P.M.)

The Conference was inaugurated by the Union Minister for Food & Agriculture, Shri Ajit Prasad Jain, who highlighted the salient recommendations of the Agricultural Administration Committee and the important suggestions made in connection with the Kharif Production Drive. (Copy of the inaugural address is placed at Appendix I).

2. The Conference, there-after, re-assembled for the business session and each State Minister made general observations, the gist of which is indicated below.

Minister for Agriculture, Andhra Pradesh (Sh. P. Thimma Reddy).

3. The Minister congratulated the Agricultural Administration Committee for having produced a useful report. He pointed out that the implementation of the recommendations would require additional funds which would be difficult to find within the plan ceilings fixed for the State. He emphasised that the schemes in the Agricultural Sector should on no account, be allowed to suffer for want of adequate funds or availability of foreign exchange or control by other Ministries.

The Minister observed, that his State had already taken steps to launch the Kharif campaign on the lines suggested by the Central Ministry of Food & Agriculture. He, however, emphasised the need for adequate and timely supply of Agricultural Credit to the farmers. He also wanted loans to be provided for raising orchards, and cash crops, such as, cashewnuts. The need for supply of chemical fertilisers in larger quantities was also stressed in view of the growing demand for the fertilizers in his State.

Minister for Agriculture, Assam (Shri M. H. Choudhury)

4. The Minister observed that the State had set up a Committee to go into the working of the Agricultural Department even prior to the formation of the Agricultural

Administration Committee and the State Government had re-organised the Department of Agriculture accordingly, which covered a number of recommendations of the Administration Committee. As a result of such re-organisation, the Departments of Cooperation, Veterinary and Irrigation have been placed under the Minister for Agriculture.

Similary, the Secretary, Agriculture, is now in charge of Cooperation, Animal Husbandry and Irrigation. Steps have also been taken to divide the state into zones, each under a Joint Director of Agriculture - a Class I Officer in the scale of Rs. 800-1150. The scales of pay of other categories of personnel in the Department have also been revised upwards. The District Agricultural Officers will now be in the grade of Rs.350-900 and the Sub-Divisional Agricultural Officers in the scale of pay of Rs.250-600. A decision has also been taken that no Agricultural Graduate will get less than Rs.170/- in the scale of Rs.170-350. It was expected that, with the revision in the scales of pay of field staff, the conditions of service in the state would improve.

Another important step, taken by the State Government was the formation of Field Management Committees for Planning and execution of the Agricultural Programme. These Committees will fulfil the objective of planning from the village upwards. While commending the recommendation regarding training of farmers and other Extension Workers, the Minister pointed out that they had proposed to set up 4 Agricultural Schools on zonal basis, out of which 3 had already been established.

The Minister indicated that the Kharif Production Campaign would be launched in the State on the lines suggested by the Centre. He, however, pointed out the difficulty caused by the disparity between prices of Ammonium Sulphate used in tea gardens and for agricultural purposes. This disparity, he thought, led to the diversion of fertilizers to Tea industry at the cost of food Crops.

Minister for Food & Agriculture, Bihar (Sh. B. C. Patel).

5. The Minister expressed high appreciation of the work done by the Agricultural Administration Committee. He referred to the remarks made by the Minister for Food & Agriculture in his inaugural speech about low yield of paddy in Bihar. While not going into the reasons for this low yield, he pointed out that one important factor which could not be ignored was the ratio between irrigated and un-irrigated land in Bihar as compared to some of the other States where the yields per acre were high. He gave an assurance that all possible measures would be taken to raise the yield. He pointed out that majority of the recommendations of the Committee had already been implemented by the State Government. The Agricultural Education in the State had been considerably strengthened with the two Colleges of Agriculture one with post-graduate training, over and above a large number of schools. He felt that, while the dominant consideration for promotion should be merit, the seniority factor could not be altogether overlooked and a via-media naturally should be evolved. While he was personally in favour of the formation of an All-India Agricultural Service, he felt that this might lead also to the demand for similar services for other departments. This question therefore, required a fuller examination. He pointed out that the State Government were able to secure full coordination between different Development Departments by making the Development Commissioner as the Principal Secretary to the Government occupying a position midway between the Secretary and the Minister. The State, he said, had established four Regional Research Stations, two of which were located in the Agricultural Colleges. Steps had also been taken to provide Subject Matter Specialists at District and Sub-Divisional level.

The Minister indicated that the State had already mounted a Kharif Production Campaign during the last season. This was followed by an intensive Rabi Production Campaign in which the State Government had trained 1 lakh Project Leaders. In the next Kharif Production Campaign, which will

P.T.O.

be undertaken on a still more intensive scale, it was proposed to train 1 million progressive farmers.

The Minister pointed out, that the Plant Protection measures to be adopted during these campaigns should cover a wider field and that the Rat Destruction Campaign should form an important item of Plant Protection Measures.

Minister for Agriculture, Bombay (Shri V.P.Naik).

6. The Minister commended the Agriculture Administration Committee Report as excellent and expressed his general agreement with the recommendations. He attached the greatest importance to the recommendation regarding recognition of agricultural department as a major department. He felt that, in at least some of the major states, it may be necessary to create a post of Agricultural Commissioner with adequate power to control other allied departments connected with food production. He also agreed with the recommendation that the officers of the Agriculture Department should be given the same status as their counter-parts in other departments, and that, merit along with seniority should be the criterion for promotion. He observed, that the decentralisation of powers - both administrative and financial, at various levels, was absolutely necessary for smooth functioning of the department and that the budget should always be an "Operational Budget". Repeated references of the approved schemes to the Finance Department caused unnecessary delay in their implementation and should be avoided. He commended the recommendation for making lump-sum provision for various schemes.

The Minister considered the outline of Kharif Production Campaign suggested by the Centre as a very comprehensive and useful one. While he indicated that preparations for launch the Kharif Production Drive have already begun, there are two important points which need to be looked into. Adequate quantities of fertilisers should be made available to the cultivators, and if necessary, preference should be given to the import of fertilisers rather than to the import of food-grains. Similarly, there was acute shortage of plant protection P.T.O.

equipments like sprayers and dusters. The state had not been able to procure the required quantity of these equipments and, consequently, as much as 10 lakhs out of the total provision of Rs. 25 lakhs made for this purpose is likely to remain unutilised by December, 1959. He felt that, power sprayers and dusters should, under these circumstances, be imported. He also referred to the shortage of iron and steel which was required not only for the manufacture of agricultural implements but also for engines and pumps. He put the state's requirements of ammonium sulphate and super-phosphate, in connection with the Kharif campaign, at 45000 tons and 35000 tons respectively. He emphasised that, with an expenditure of about Rs. 9 lakhs on the Kharif Campaigns, it may be possible to produce food-grains worth Rs. 10 crores. Under these circumstances, it was obligatory that adequate facilities should be provided for making the campaign a success. For execution of the programme, the Minister pointed out that the Farmers' Unions were being formed at the village level and necessary training of progressive farmers was being arranged. It was only by utilising these trained farm leaders that necessary enthusiasm for the drive could be generated amongst farmers.

Chief Minister, Madhya Pradesh (Dr. K.N. Katju).

7. The Chief Minister also congratulated the Agricultural Administration Committee for having produced a useful report. He indicated that the question of integration of services and pay scales of the four units comprising the reorganised Madhya Pradesh State was receiving attention and the recommendations of the Agricultural Administration Committee would be given due consideration in that connexion. He felt that the suggestion to combine the portfolios of Irrigation, Agriculture, Animal Husbandry, Cooperation, etc. under one Minister was not feasible. Instead, it might be more desirable to constitute a standing Cabinet Sub-Committee composed of the Ministers in-charge of different Development Departments for necessary coordination. He felt that the ocular demonstration was effective in convincing the farmers of the

efficacy of improved methods of cultivation and, suggested that utmost emphasis need be given to the establishment of Village Demonstration Farms. It may also be desirable for every officer of the Department of Agriculture, from the Director of Agriculture downwards, to adopt each a particular village to establish direct contact with the farmers, understand their problems and to find out practical solutions. In his opinion, another method to extend the results of research to the door-steps of farmers was to help agricultural graduates to settle on farms and to practise improved farming. The farms operated by such agricultural graduates could serve as centres for dissemination of knowledge on improved techniques. He also felt that the technical staff should not be burdened with routine administrative matters.

The Chief Minister indicated that the state will launch the Kharif Production Campaigns on the lines suggested by the Centre and assured the fullest cooperation in making it a success.

Minister for Agriculture, Madras (Shri M. Baktavatsalam).

8. The Minister pointed out that his State had anticipated some of the recommendations made by the Agricultural Administration Committee and had already taken steps to implement them. He indicated, that a Committee had already been set up to undertake a comprehensive survey of problems relating to agricultural production. The schemes, such ^{as} upgrading of the College of Agriculture at Coimbatore, subsidy on green manure seed, which were considered useful, were being executed by the State without any assurance from the Centre for financial assistance. He stated that, in his state, while the Director of Agriculture was an experienced administrative officer with no technical qualifications, the Additional Director of Agriculture was a technical man who looked after research and education; five Joint Directors of Agriculture, dealing with inspection, development, agricultural engineering, community development work and seed farms were also functioning in the State; at the district level, there was one Agricultural

Officer in each district and the larger districts were bifurcated into two units, each having one Agricultural Officer.

The Minister indicated that he was not very enthusiastic about the formation of an All-India Agricultural Service. However, the possibility of setting up a higher cadre to attract qualified people might be considered. He pointed out, that the coordination between the different departments was being achieved through the State Development Committee, both at Ministers' and Officers' levels. In addition, the Commissioner for Food Production in the State coordinated the programmes of Agriculture and Irrigation Departments. The State had also a Research Council with heads of different departments as members, which was effective and had the last say on all research problems. The State had as many as 28 agricultural research stations, a few of which are proposed to be upgraded as Regional Research Stations.

While the per acre yield of rice, which is the major crop to be taken up for the Kharif Production Campaign, was amongst the highest in India, the Minister pointed out that efforts would be made to increase the yield still further. The State had already undertaken the planning of the Kharif production drive and produced a guide book in regional languages similar to the one circulated by the Centre. He laid great stress on the need to assure fair prices to the farmers for their produce and its determination and declaration well in advance.

Minister for Agriculture, Mysore (Shri K.F. Patil):-

9. The Minister indicated that the Department of Agriculture was considered a major department in his State, and merit and seniority both counted for promotion. They had also taken steps to appoint a Joint Director of Extension and attach an Administrative Officer to the Director of Agriculture for looking after administrative matters. The pay

scales had also been revised in 1957 and it was not possible to consider further revision for some time to come. These scales of pay, however, were quite near to those recommended by the Agricultural Administration Committee. The percentage of temporary staff in the department was 46 and an effort was being made to reduce it to 25. The recommendation relating to decentralization and delegation of powers at various levels had already been implemented and budget procedures had also been considerably simplified. The Minister pointed out that the minor irrigation programme was still under the charge of the State P.W.D., but they were pursuing the question of having a separate Works Division in the Department of Agriculture for attending to irrigation and other construction schemes. The question of formation of an All India Agricultural Service needed further consideration and the State Government had not yet made up their mind in the matter.

While the kharif campaign on the lines suggested by the Centre will be launched in the State, the Minister pointed to the shortage of iron and steel for manufacture of plough points. He also mentioned that the State was not able to get insecticides, sprayers and dusters in time for saving crops from pest attacks. The Minister also made a plea for sanction of loans for sinking of wells at the rate of Rupees three thousand per well, as the existing rate of Rupee One thousand was not enough.

Minister for Agriculture, Orissa (Shri Rath)

10. The Minister while commending the recommendations of the Agricultural Administration Committee, pointed out that his State had not so far been able to achieve the necessary amount of integration and coordination at the top level.

While the Minister for Agriculture was in charge of other Development Departments also, the Community Development was under a different Minister. Similarly, minor irrigation was being handled by two or three different Departments, such as Revenue, Tribal and Rural Welfare, Agriculture, etc. He

suggested that if all the portfolios could not be combined under one Minister, it may be desirable to constitute a Sub-Committee of the Cabinet for achieving coordination between different Development Departments. He assured that integration of research, extension and education was being carried out in his State and will be completed in the next two years. He pointed out that it had not been possible for the State to revise the pay scales, specially of the lower staff, on account of the paucity of funds. He, therefore, made a plea for Central Assistance, so that this important recommendation could be carried out.

Similarly, he wanted that additional funds should be provided, over and above the Plan allotment, for taking up minor irrigation programmes. He emphasised the need for fixing reasonable prices for agricultural produce as an incentive for increased production.

Minister for Agriculture, Rajasthan (Shri N.R. Mirdha):

11. Shri N.R. Mirdha, Agriculture Minister of Rajasthan, while joining his colleagues in the appreciation of the work done by the Agricultural Administration Committee, observed that the recommendations, which do not involve any financial commitments, will be implemented as soon as possible. So far as the recommendations having some financial implications are concerned, the Agricultural Department alone cannot take any decision in regard to their implementation, and as such it will take the State Government some time to give effect to them, in consultation with other concerned departments. The Minister pointed out that perfect coordination had already been achieved at state and district levels and village-wise targets of agricultural production have been fixed in consultation with the villagers.

The Minister observed that satisfactory work had been done in regard to the distribution of seeds, fertilizers and implements under the current Rabi Production Campaign and hoped that the campaigns would be a success. They have also completed the planning of the next Kharif Production Drive in which improved

seeds of Jowar, bajra, etc., to a limited extent will also be distributed.

Minister for Agriculture and Cooperation, U.P. (Sh. M. L. Gautam).

12. The Minister pointed out that there would be no difficulty in implementing the recommendations of the Agricultural Administration Committee, which do not involve any financial commitments. The implementation of other recommendations which involve financial implications will require additional funds which the State may not be able to find from within their existing resources. In view of this, the Minister made a strong plea for Central assistance so that such recommendations could be given effect to within the stipulated target date. He further pointed out that while the existing scales of pay in the Department of Agriculture can be favourably compared with those in any other State, his State will be inclined to consider any suggestions for improvement provided the financial assistance from the Centre is forthcoming. The question of merit vs. seniority was also being taken into account for promotions in the State. Similarly, the recommendation relating to delegation of powers, both administrative and financial, has already been implemented. Adequate steps were also being taken to make the temporary staff of Agriculture Department permanent at the rate of 33% every year. The State Government have also taken decision to transfer the trading functions of the Agriculture Department to Cooperatives. With the establishment of the Rural University at Rudrapur, the coordination between research, Extension and education will receive a further fillip in the State.

The Minister observed that his State had taken lead in launching Kharif Production Campaign similar to the one now suggested by the Central Ministry of Food and Agriculture. The last Kharif Production Drive had yielded satisfactory results and the production of rice was estimated to have gone up from 22.90 lakh tons to 28.55 lakh tons. As against 2½ lakh Gram Sahayaks trained during the current Rabi Campaign,

they propose to train 1 million Gram Sahayaks for the next Kharif Campaign. It will, thus, be possible to utilise Gaon Sabhas for execution of the programme. The Minister pointed out that the supply of nitrogenous fertilizers should be speeded up so that it could be made available to the farmers in time. The Minister for Food and Agriculture gave assurance that all available fertilizers allotted to Uttar Pradesh will be moved by the end of May, 1959.

Minister for Agriculture, West Bengal (Dr. R. Ahmed):

13. Dr. R. Ahmed, Agriculture Minister, West Bengal, pointed out that the re-organisation of the Department was already under way and that the West Bengal Government was absolutely opposed to the creation of an All India Agricultural Service.

While the Kharif Production Campaign would be launched in the State on the lines suggested by the Centre, the Minister indicated that one important factor which has to be taken into consideration is the price support as this alone would provide the real incentive to the farmers for increasing production. It was no incentive for the farmer to produce more and suffer on account of receiving lower and uneconomic prices as in the case of jute.

14. After the general observations of the State Ministers of Agriculture, the Chairman indicated that the State Officials would meet in the afternoon of 6th February and forenoon of 7th February for a detailed consideration of the items of the Agenda. It was agreed that the State Ministers would re-assemble in the afternoon of 7th February to consider the recommendations made by the State Officials.

Plenary Session (February, 7, 1959)

The Recommendations made by the State Officials on the items of the Agenda were considered at the Plenary session by the State Ministers. The recommendations as accepted by the conference are indicated below:-

Item 3(a) Recommendations made by the Agricultural Administration Committee.

Category A: Recommendations with no financial implications requiring immediate implementation.

<u>Paragraph Reference</u>	<u>Summary of recommendations.</u>	<u>Recommendations made by the Conference of State Ministers of Agriculture.</u>
2.3.	In the opinion of the Committee, this tendency of depending upon stimulus from the Centre for taking action on a subject which is the main responsibility of the State is not a healthy one.	Noted for general guidance. (The question of Central Government giving more funds for agricultural research was raised. It was explained that the responsibility of the States for local research could not be disowned. In the case of the States which are already spending substantial funds for research and are not in a position to find additional funds for new research schemes, the question of centre giving more liberal assistance would be considered on merits of each case.)
***	Rupees two crores	The recommendation of the Indo-American Team for distributing *** annually to the States for augmenting their funds for agricultural research should be pursued by the Government of India in the Third Plan.
2.4.	The Committee has recommended that the States should periodically undertake an examination of the structure, objectives and policies of the Department of Agriculture.	Accepted.
2.13 & 2.14.	This recommendation relates largely to the appointment of technical officers in the top posts in the State Departments of Agriculture. The Prime Minister has remarked that top posts in the State Agriculture Departments should be manned by technical men with practical experience of agricultural problems.	On the understanding that the recommendation related to the appointment of Directors of Agricultural and Veterinary Services in the States, the recommendation was accepted except by the Madras representative who clarified that it would not be possible for the State to reserve it for any particular service, technical or administrative.
2.15.	The Committee has recommended that suitable steps should be taken to remedy the situation arising from lack of recognition of the Agriculture Department as a major and important Department. The willingness to do so is still lacking and the importance attached to Agriculture has to be reflected in a concerted effort to improve the conditions of agricultural services.	Accepted.

- 2.28 & 2.29. The Committee has emphasised the need for adequate recognition of merit at all stages and has suggested that those who do not show initiative and progress should not get their advancement in service merely because they happen to be senior.
- 3.12. The Committee has emphasised the need for advanced planning of training programmes in foreign countries. This assessment should be done on a long-term basis for each State and panels of suitable candidates for different subjects kept ready. The Committee has recommended that the State and the Central Government should nominate only those candidates for foreign training whose names are on the approved panel prepared in advance. The Central Ministry of Agriculture should keep such a panel of names handy so that fullest use can be made of the educational assistance offered by foreign countries. Steps have also to be taken to ensure that officers after receiving training abroad are posted back to the subject of their specialisation.
- 3.14. The Committee has recommended that periodical examinations should also be held for departmental staff after they have received training or have attended refresher courses and those who fail to pass these examinations should not be confirmed, promoted or permitted to cross the efficiency bar. The Committee has specially made this recommendation in view of the prevailing tendency to attach little importance to refresher and other courses held by State Departments and to treat them more as a holiday at the cost of Governments.
- 3.15. For recognising competence, initiative and keenness, it is necessary that there should be adequate and thorough technical supervision at different levels. The Committee has emphasised that the right types of officers should be located, trained and their work appreciated properly.
- Accepted with the proviso that merit coupled with seniority will be taken into consideration with regard to promotions. Where posts have been classified into selection and non-selection posts, the suggestion would be followed with regard to selection posts.
- Accepted.
- The need for Refresher Courses to tone up efficiency was generally recognised. Each State will work out its own procedure for achieving the objective. It was agreed, however, that the States would provide facilities for training to particular groups where such training was considered essential. Wherever such training facilities are provided, the staff would be expected to take full benefit of the facilities and this would be determined by appropriate assessment.
- Accepted.

- 3.16. For the assessment of the quality and quantity of work turned out, rather than of the personality of the individual, the committee has recommended assessment by special Boards once in 3 years. In case of gazetted Officers, the Committee has recommended that State Governments should have agricultural scientists and technical men of repute as members of the Assessment Board. These reports will enable the Director of Agriculture to assess the work of his departmental officers periodically.
- 4.2. The Committee has noticed a tendency that the coordinating bodies in the States function in a routine manner and there was little evidence of systematic follow-up action. These coordinating bodies do not meet often and in the absence of adequate vested authority, they cannot operate successfully. To secure better coordination of work the Committee has commended the pattern prevailing in one State in which the Development and the Food Production Commissioner functions as the Principal Secretary to Government and occupies a position which is mid-way between the Secretary of a Department and the Minister-Incharge. The Principal Secretary has been vested with sufficient powers such as the authority to write the confidential reports of the Secretaries to Government and Heads of Departments with which he is concerned.
- 4.3. The Committee has expressed the view that there are far too many directives from the top and there is too little supervision and effort to look to matters on the field. Field Officers are burdened with far too many returns in some States as many as 30 to 40 returns have to be prepared and submitted every month. In the opinion of the Committee coordination does not mean multiplicity of reports and returns. What is required for purposes of coordination is that coordinating committees must meet frequently on pre-determined dates and such meetings should receive due priority. The Committee has recommended that at all levels, sufficient power and authority should be vested in the coordinating committees.
- The State Governments would take such action as they consider necessary.
- The State Governments would give careful consideration in the light of the spirit underlying the recommendation for achieving proper coordination at official level.
- Accepted. The Centre would take similar action and replace monthly reports by quarterly reports.

- 4.4 In these paragraphs, the Committee Accepted.
to has suggested a method for the
4.6 coordination of research, extension and educational programmes in the State Agriculture Departments. The personnel of such coordination committees has also been suggested.
- 5.2. The Committee has also suggested Accepted.
that heads of research sections should continuously study and evaluate the progress made in extending the recommendation of the research officers and translating them into field practices. This study should be carried out by experienced Officers of the research sections.
- 5.3. The Committee has emphasised the Accepted.
to need to have an intensive drive
5.5. with a view to promoting follow up work, as greater emphasis has to be placed on the actual achievement and not so much on the potential created. The inspecting officers during their inspections can assist considerably in emphasising these points by making a study of the follow up programme and the use to which a particular facility is actually put. The Committee has felt that inspection and supervision have been relegated to the background and have been replaced by ad hoc short visits of the supervising officers for solving immediate problems or for gathering urgent information. The Committee has, therefore, recommended that these instructions should now be implemented and the work-load of inspecting officers should also be studied.
- 5.6 The Committee has suggested senior Accepted.
officers should be in continuous touch with the working progress under their control through a system of oral reports from officers immediately below them on a prescribed date in a week or a fortnight. Such oral reports would provide opportunities for officers at all levels to discuss with their senior officers local problems periodically and help the senior officers to keep the work under continuous review.
- 6.7 The Committee has in this paragraph Accepted.
referred to the role of Agriculture Departments in policy making and has emphasised the importance of programme planning. In paragraphs 2.4 and 2.5, the Committee has, in this context, recommended that both in the States as well as at the Centre, special committees consisting of eminent agricultural administrators, scientists and progressive farmers should be appointed once in 5 years, to examine programmes and policies so as to

provide a balanced growth by enunciating programmes and policies in consonance with existing needs.

6.8 The Committee has emphasised
to the necessity for developing
6.10 self-help programmes which
could benefit the small farmer
who is generally non-credit-
worthy in the usual sense of
word. The purpose of these
self-help programmes is to
decentralise the distribution
and multiplication of improved
seed and also to reduce the
quantities handled, transpor-
ted, stored and distributed by
Government. For building up soil
fertility, three basic problems
viz., green manuring, production
of compost and planting of fuel
trees as pointed out by the
Committee, are capable of uni-
versal adoption. This would
leave the Department or Depart-
ments of Agriculture free for
carrying out their educational
campaign. The local multipli-
cation of seed, the production
of local manurial resources and
the production of additional
fuel for the farmer are the
three big problems which can
be taken over extensive areas
all over the country and for this
purpose, the Department of Agri-
culture should be left free to
carry out this programme and
provide the necessary encourage-
ment and drive for the purpose.

With regard to the plant pro-
tection measures, the Commi-
ttee has suggested that farmers
should be persuaded and helped
to own equipment and insecticides,
either cooperatively or in-
dividually while the Departments
of Agriculture should organise
demonstrations and a post
warning service and should also
keep available big power equip-
ment to combat pests and disease
in an epidemic form.

6.11 The Committee has recommended that It was felt that with the
State Agriculture Departments existing staff planning at
should evolve plans for increasing village level was impracticable.
agricultural production in every However, it was agreed that
village rather than for executing planning up to village level would
the targets of distribution of be done in the National Extension
seeds, fertilisers etc. If inte- Service Blocks; in the shadow
grated plans for increasing the blocks it would not be possible
production in a village are pre- for want of staff.
pared and executed, the targets
prescribed for the Second Five
Year Plan will be taken care of
automatically.

Accepted. (Many State representa-
tives, expressed the view that
the central share of the subsidy
in developmental grants intended
as subsidy to the cultivator
should be made available even if
the States were not in a position
to find funds for their matching
grants. It was explained on
behalf of the centre, however,
that as the grant was intended to
reduce the cost to the cultivator,
both the centre and the States
will have to play their part.
The view was expressed that Plant
Protection measures should be
heavily subsidised in view of
the high cost of insecticides
and pesticides and the need for
popularising modern plant protec-
tion measures among farmers).

7.1
to
7.7.

The Committee has observed that the existing procedures of budgeting and the incurring of expenditure retarded the progress of work and the execution of schemes in the agricultural sector. The Committee has, therefore, recommended that means should be devised to ensure that the expenditure is not concentrated during the last quarter of the financial year. In the same context the Committee has recommended that various stages of action from the formulation of schemes to their implementation should be completed more expeditiously and unnecessary references to the Centre and the State Finance Departments should be eliminated. The Committee has, therefore, suggested that certain consequential readjustments in the calendar that might have been laid down for the preparation and presentation of the budget in the State Legislatures may be undertaken.

A lumpsum provision may be made in respect of the schemes for which complete and detailed examination cannot be made due to lack of technical data.

Once the schemes have been included in the budget after proper scrutiny, a second reference to the Finance Department for expenditure sanction before their implementation should not be necessary.

7.10
to
7.15

The Committee has observed that implementation of projects suffer due to lack of powers of the officers entrusted with implementation. In the interest of speedy execution, there should be greatest delegation of powers at all levels from the Director of Agriculture downwards. Financial powers of officers at all levels should be examined urgently and wherever necessary revised, taking into consideration the changing needs of the expanded development programme. The Committee has made suggestions for Financial and administrative powers which may be delegated to officers at various level in the State Agricultural Departments.

Accepted with the modification that with regard to work expenditure bunching of expenditure at the end of the year could not be avoided to some extent.

Accepted. Each State would examine the maximum delegation of powers at all levels.

- 7.20 After the delegations suggested above have been made, the Committee has suggested that steps should be taken to codify all financial and administrative powers now distributed over different books and executive instructions. The Officers should have a clear indication of their financial and administrative powers. Accepted.
- 7.21 The Committee has recommended that officers taking initiative and responsibility should feel that Government trusts them in the exercise of their powers and the delegation of powers should be both in letter and in spirit. Executive instructions which circumscribe normal financial and administrative powers of officers should be issued only after due consideration and for very weighty reasons. The Committee has recommended that a review of all such instructions should be made every six months preferably by a Committee appointed by the State Governments with a view to removing them or making them part of the permanent rules where considered absolutely necessary. Temporary restrictions should not be allowed to remain in force for more than six months. Accepted, subject to the proposed review once a year instead of ~~six~~ months.
- 7.22 Each Officer should be given as an ad hoc measure, powers to execute specified schemes for which budget provision has been made even though the expenditure on a particular item may exceed his normal financial powers. Such ad hoc authorisation may be effective during a particular financial year and give absolute power to certain Officers on important schemes within the ceiling of the budget provisions and subject to their observing other codal formalities. It was agreed that the suggestion was very useful but would require examination by the States sympathetically in the light of other financial considerations.
- 7.23 Indenting departments should be authorised to purchase direct, instead of through the State purchasing organisations, technical stores and stores of value after observing codal formalities. The existing procedure impedes the execution of Plan schemes and much labour and time will be saved if the Rules would be examined by the States and amended, if necessary.
- 7.24 Indenting Departments are authorised to effect purchases direct after observing the codal formalities. Similarly the Committee has suggested that discretionary powers should be given to Officers incharge of State Transport Vehicles engaged on essential food production work to get

emergency repair done outside the departmental workshops, where the interest of public service justifies this course.

- 9.1. The purpose and junctions of the Agricultural Departments, according to the Committee, should be not only to provide facilities for educating and training the farmers, but also for training the personnel required for manning the services connected with agriculture. The Agricultural Departments should demonstrate to the farmers better methods of cultivation and disseminate knowledge about these methods through various audio-visual channels and organise farmers for adopting the improved techniques of crop production and working together for purposes of common benefit in activities such as land development, protection of crops, marketing and organisation of self-help programmes.

Accepted.

The Supply of seeds, fertilisers, implements, agricultural machinery and plant protection equipment etc. is not considered to be the legitimate role of the Department of Agriculture though this is certainly the function of the welfare state in the opinion of the Committee has recommended that it is necessary for the agricultural extension staff to concentrate solely on educating and organising the farmers to produce more; in other words, the department should deal with technical knowledge and education rather than trade in supplies.

- 9.2. The Committee has recommended that the feasibility of the portfolio of Agriculture and Irrigation being held by one Minister should be considered. There is a gross lack of coordination between the Agriculture and the Irrigation Departments and it appears desirable to place the responsibility for both in a single authority.

The Committee has further recommended that the feasibility of all subjects connected with agriculture being distributed between two Secretaries, to Government should also be examined. They have suggested that the Secretary for Agriculture may deal with agriculture, land reclamation, soil conservation in agricultural lands, animal

There was general feeling that the combination of agricultural and irrigation portfolios under one Minister might be cumbersome. The Ministers agreed that coordination between the state departments concerned with the agricultural sector of the Plan should be effected by a Sub-Committee of the Cabinet, consisting of the appropriate Minister. The sub-committee could meet on specified dates once in a week or once in a fortnight to take decisions on matters concerning two or more departments.

husbandry and Veterinary science and the Secretary for Irrigation may deal with irrigation, forests including soil conservation, cooperation and agricultural marketing.

The Committee has also recommended that frequent changes should be avoided.

- 9.3. The Committee has recommended that the construction of irrigation wells and construction of repairs of small minor irrigation works which do not cost more than Rs. 10,000 should be the responsibility of the Community Development Agency. The Agricultural Departments should attend to minor irrigation works costing above Rs. 10,000 but generally not more than about Rs. 80,000. Works costing more than about 80,000 may be handled by the Irrigation Department.

It was generally felt that for fuller utilization of Irrigational facilities the Agriculture Department or the Directorate of Agriculture should have an Engineering Wing which could execute works up to a certain level to be determined by each State. Schemes requiring higher technical skill should go to the Public Works Department. It was unanimously felt that no such arrangement would be required in the Community Development agency. All irrigation works which do not require high technical skill should be executed by the Agriculture Department under the arrangement mentioned. The State Governments would examine the suggestion in the light of local conditions.

- 9.8. In States where there are special posts of Development Officers for various crops; these officers may work as deputies of the Extension specialists in Agronomy. The appointment of such deputies according to the Committee is justified only where a particular crop deserves special consideration in a State. This will need examination in the States (Category A).

- 10.1. The Committee has reiterated the Accepted. recommendations made by the Joint Indo-American Team on Agricultural Research and Education that the total research programme is inadequate to meet the needs and demands for improved agricultural materials and practices. For increasing Agricultural production substantially, we have to rely more and more on improving the efficiency of production by evolving scientific methods.

CATEGORY B: RECOMMENDATIONS HAVING MINOR FINANCIAL IMPLICATIONS REQUIRING URGENT IMPLEMENTATION.

Recommendation made by the Conference of State Ministers of Agriculture

Suggestions made by the Centre to implement this recommendation were accepted.

Accepted.

Accepted.

Accepted except by the West Bengal representative who was not able to agree. It was understood that fresh recruits will receive suitable training before appointment and officers in service will receive refresher training.

Accepted. It was agreed that the Centre would endeavour to supply Extension type literature free of cost upto Block Level. The literature would be that which could be useful and utilised by officers and staff at that level and not big books which are required for reference

Paragraph Reference Summary of recommendations.

2.12 The Committee has observed that in the State Departments of Agriculture there was only a handful of senior and competent officers and the gap between them and those who can take over after them is a disconcertingly wide one. There is an acute shortage of experienced agricultural officers with vision, initiative and drive.

2.30 The Committee has suggested the creation of super-numerary posts so that the staff with requisite aptitude and competence in a special subject is continued in the same line without allowing their prospects of promotion to suffer.

2.37 to 2.38 Service rules have not been revised in some States for the last 25 years and in some States no recruitment rules exist except for a few senior posts. Nor is there any system of framing qualifications and method of recruitment. The Committee has for this purpose recommended that an experienced Administrative Officer from the Appointments Department should be placed on deputation with the Secretary, Agriculture, for drafting or revising rules of agricultural services.

3.1 to 3.9 The Committee has made important recommendations for providing different types of training to the existing staff as well as to the fresh agricultural graduates recruited in the Agriculture Departments. These training courses should be conducted by senior, experienced and competent officers and should be systematic and should operate in an automatic manner.

3.10 Regular supply of current literature to the departmental staff in order to keep them fully abreast of modern developments in the field of Agriculture is very necessary.

purposes. It was agreed that the States would improve the distribution arrangement so that literature received in the Blocks is distributed speedily to the concerned staff, such as, V.L. Ws, Extension Officers, etc.

Accepted.

3.11 The Committee has laid special emphasis on providing adequate training in Farm Management and Farm Planning at 3 or 4 selected farms which should be under the control of a competent Farm Manager. This training course should be organised for the benefit of new entrants to the Extension Branch and is specially necessary at this stage when seed multiplication farms are being established in the country in large numbers. The Committee has also suggested that farm management courses should be organised at other institutions such as the agricultural colleges and schools, etc.

2.13 The Committee has recommended the creation of training reserves so that regular departmental work does not suffer in the absence of personnel deputed for training. In all categories in Agriculture Department where there are particular subject, a training and deputation reserve has been/normal leave reserve./recommended in addition to the

Accepted as essential subject to financial implications being worked out by each state.

4.7 These paragraphs refer to a gross lack of coordination between the to Irrigation and the Agriculture Departments both at the level of 4.8 planning and execution in the field. The Committee has indicated a Coordination Committee for Irrigation and Agriculture Departments and also posting of Agricultural Officers in the Irrigation Departments with the Superintending Engineers. The duty of these Agricultural Officers would be to serve as a liaison between the Agriculturists and the Irrigation Department. They will be technically under the Director of Agriculture. The Committee has further recommended that Departments of Agriculture should be taken into confidence and special Agricultural Officers should be attached for ensuring maximum utilisation of water.

Coordination between the Agriculture, irrigation and other Departments was considered necessary for optimum utilisation of water available for irrigation purposes. It was thought, however, that instead of having a separate committee, the Cabinet Sub-Committee recommended under recommendation 9.2 could attend to this function. It was agreed that a special Agriculture officer would be required for liaison work with the Irrigation Officers but he should be under/control of / the Agriculture Department.

5.1 The Committee has recommended the formation of a small unit at the headquarters of the Director of Agriculture for the purpose of evaluating and assessing the progress of new extension recommendations, land development schemes and schemes for training

Accepted. The nature and composition of the unit will be worked out by each State.

and organisation of the farmers.

- 7.14 Organisational improvements such as the posting of an Internal Financial Adviser with powers to take decision in the State Departments of Agriculture should be undertaken. The Committee has specially-emphasised the fact that these Advisers should have definite powers to take decisions on behalf of the Finance Department and should not be permitted to become an additional channel of approach to the Finance Department.
- The Committee agreed that this was a good suggestion and would be adopted by States where difficulties are now felt about financial control or where work load justifies the appointment of a separate Financial Adviser.
- 9.4 The minor Irrigation Branch of the Agricultural Department should be equipped to bore wells and sink tube-wells in suitable areas on behalf of the cooperative Societies and the individual farmers. Minor Irrigation Programme, including tubewells should not be handled by the P.W.D. as this Department cannot be expected to give as much importance to minor irrigation works as it does to its regular works of much bigger dimensions. The same holds good for the building programme in the agriculture sector of the plan. The Committee has recommended the setting up of a Works Division within the Directorate of Agriculture under a qualified Joint Director with full powers of a Superintending Engineer so as to ensure speedy implementation of both minor irrigation and the building programmes within the Agriculture sector. A research wing for agricultural implements and machinery should also be added to this sector.
- Accepted in principle but the level of the officers to be appointed would depend on the magnitude of the work in each State.
- 9.5 Soil Conservation on agricultural lands should be the function of the State Agricultural Departments and in the Forest areas of the Forest Department and care should be taken to see that an independent department of soil Conservation does not spring up. The Committee has recommended that subjects like land reclamation, minor irrigation including drainage and flood control (also refer to paragraph 9.3), and soil conservation should all be assigned to a single branch which may be designated as the Land Development Wing or Branch of the Department of Agriculture. This Branch should also be responsible for popularising improved implements and agricultural machinery. The Committee has recommended that pending the recreation of the Land Development Wing, the responsibility for the execution of minor irrigation programme should be transferred from the District Agricultural Staff to the Engineering Staff in the Agriculture Department so that the District Agriculture
- Agreed in principle.

staff can be left free to carry out its legitimate educational work.

9. There should be an administrative officer subordinate to the Director of Agriculture to relieve him of routine administration. This officer should deal with all establishment cases and should be drawn from the State Civil Service. In Addition there should be Budget and Accounts Officer drawn from the State Finance and Accounts Service for relieving the Director from routine and accounts matters.

Accepted. But details to be worked out by the States.

10. A full time progress and evaluation Officer assisted by a small unit of the staff responsible for the collection of developmental and statistics on one hand and evaluation of programme on the other. This unit should keep in touch with the Departmental programme and keep them under continuous review and measure their success or otherwise in the field, so that any defects of execution or planning could be rectified. In states which had a senior Statistician attached to the Director of Agriculture, the Progress and Evaluation Officer could be placed under him.

Accepted.

16. The farm Advisory Service to be fully effective should be supported by an Agricultural Information Service consisting of trained staff of Information Officer specialising in mass communication methods. The Agricultural Information Service will be expected to prepare extension publications, leaflets, pamphlets charts, exhibits, visual aids which form an important plank in conveying agricultural information/ Units wherever mixed up with publicity and propaganda, should be separated and located in the Agricultural Departments and should be developed as soon as possible into full fledged Agricultural Information Bureaus. The Bureaus should be placed under the charge of an Information Officer who should be equal in rank to the head of the Department and he should have adequate staff, equipment and funds to defectively carry out his work.

Accepted with the plea of clarification that the Information Officer's rank should be that of a head of a Section as in the printed report.

4. The Agricultural College must remain in constant and vital touch with the farmers and their organisations and make teaching and research more practical and ensure a free flow of agricultural problems and results of research back and forth between the village and the research laboratories

Accepted in principle and the States would work towards this objective.

and farms. The teacher, the research worker, and the extension specialist should be teamed together and placed under the technical and administrative control of one and the same officer in each major field of Agricultural science.

10.5

In order to provide an effective link between the agricultural research and Education, the Committee has suggested the setting up of an Extension Section in the Agricultural Colleges under a Professor of Extension whose function will be to teach extension methods to the students so that they may develop into effective extension workers. The duties of the Extension Staff will be to develop appropriate technique to suit various situations and to organise research in extension methods.

Accepted.

10.6

The Committee has also recommended that Extension Specialists should be attached to all the main regional centres of Research.

Accepted. (It was pointed out that the recommendation No.10. was only the duplicate of No.10.5.)

10.11

For bringing about close coordination between Research, Education and Extension Branches, the Committee has recommended that arrangements should be made for holding annual and half yearly Conference at the major Research Stations. This Conference should be attended by all officers connected with Research and Extension working in the Region. A similar meeting at the District level, for a day or two, once in 3 or 4 months may also be recommended.

Accepted

10.13

The Committee has recommended that retired Specialists who have settled down in different parts of the Country should be utilised and associated with the supervision of local schemes and in Research Institutions. They could be given some honorarium to compensate for their out of pocket expenses.

Accepted.

CATEGORY C: Recommendations having substantial financial implications and which should be implemented by the end of 1959.

.-.-.-.

Paragraph reference

Summary of recommendations

Recommendations made by the Conference of State Ministers of Agriculture.

2.19

The Committee has pointed out that any thing from 30% to 80% of the posts in State Departments of Agriculture are still temporary. The pensionary rights of agricultural employees are adversely affected by the temporary nature of the posts not only in the State Departments of Agriculture but also in the I.C.A.R. & Commodity Committee schemes.

Accepted in principle. Implementation will depend on availability of funds.

2.20
to
2.25

The Committee has pointed out that the low scales of pay prevailing in the agricultural services do not attract good human material. In the opinion of the Committee, strong agricultural departments cannot be built unless this handicap is removed. There is a strong need, according to the Committee, for planning and distribution of national intellect and talent.

Accepted.

2.26
and
2.27

In order to provide opportunities for promotions to higher posts, the Committee has recommended the creation of selection grades with attractive grades of pay. The percentage of selection grade posts should also be as provided in the administrative services.

Accepted in principle. Efforts will be made to provide selection grades in regard to groups of posts where prospects of promotion are inadequate.

2.34
to
2.36

In the opinion of the Committee, nothing short of forming an All-India Agricultural Service, with scales of pay and prospects at par with the I.A.S., would raise the morale and efficiency of agricultural services and thereby attract equally suitable material for manning the services and bring about the uniformity of standard.

Not accepted. The difficulty of obtaining suitable officers for Union Territories was also mentioned and the following suggestions were offered:-

The Centre might organise a pool of officers exclusively for the Union Territories or as decided in the Eastern Zonal Council, the neighbouring states would make special effort for providing the

requirements of the Union Territories which meant that they will have to increase their deputation reserve for the specific purposes.

6.6

The Committee has observed that gradually and imperceptibly the propaganda or the extension branch of the Department of Agriculture was converted into a machinery for executing land development works and for distributing supplies such as fertilizers etc. The principal task of educating/new methods of cultivation receded into the background and the concept of benefiting the farmer by supplying him the required materials or by carrying out the required land developments schemes came to be recognised as the principal task. As further pointed out by the Committee in paragraph 8.14 the time has come when the entire organisation for the supply of fertilizers, improved seed, insecticides and agricultural implements must be separated from the truly extension and technical functions of the Agriculture Departments and Transferred preferably to the Cooperative Organisations in the States.

/the farmers adopting

Accepted with the clarification that the agency to which the trading function should be transferred should be left to the States depending upon local conditions.

8.8

Adequate storage facilities for stocking fertilisers are also not available in the States and the number of distributing Centres are not sufficient to meet the requirements of the cultivators.

matter will have to be

It was agreed that the storage facilities within the reach of farmers is inadequate. Cooperatives have also no adequate storage facilities. Funds would be required to build storage space and the/locked into by the Ministry of Community Development.

8.9

The Committee has recommended that the State Departments of Agriculture should not involve themselves in the distribution of non-discript seed and should confine their attention only to the propagation on Government farms, of improved pedigree seeds of guaranteed purity, which has been inspected and rogued in the field prior to harvesting and threshing of the crops.

Accepted.

8.14

Supply functions of the agricultural departments.

Same as 6.6

.6

At the headquarters of Director of Agriculture, the following organisation has been suggested by the Committee:-

Accepted in principle but each state will have to examine the details bearing in mind the suggestions made by the Committee.

(i) Joint Directors for looking after (a) Land Development and Works (see paragraphs 9.3 & 9.5) (b) Extension & (c) Research & Education.

(ii) A Deputy to the Joint Director for Research and Education in larger States.

(iii) Deputy to the Joint Director of Extension for looking after the large number of seed Farms which have already been opened. The Committee is of the view that all such farms together with other farms which the States might have would require expert knowledge and guidance of an Officer who will be a Deputy to the Joint Director for Extension. The Committee has further recommended that this officer should be fully responsible for the running of all the farms in the State and should operate on the budget of these institutions which should be centralised where-ever found necessary.

.7

The Joint Director of Extension should be supported by at least 4 Extension Specialists in Agronomy, Plant Protection, Soils and Soil Fertility, Horticulture and any other subjects depending upon local conditions. The Extension Specialists should formulate statewide plans for the extension of research findings and to remove technical difficulties encountered in their extension. These specialists should be drawn from the Research Section and should work in close liaison with the Research Officers, so that the translation of the results of the research into field practices is not delayed. These extension or subject matter specialists, with training in extension methods will constitute a Farm Advisory Service which should keep in close touch with agricultural research being done at the Central, State and Commodity

- do -

Committee Research Stations and formulate authoritative recommendations on farm practices and techniques for use by the Agricultural Extension Officers of the Blocks. This organisation will also help in planning and organising crop campaigns.

The Committee has recommended that the training of young officers should be an important assignment for all the Joint Directors.

9.11

The Committee has recommended that the Extension Specialists at the Headquarters of Director of Agriculture should be supported by similar specialists at the District level. In States where the Extension programme is not well developed or where the districts are small, these specialists may serve a group of districts. The Committee has also suggested that for developing the programme relating to food-grains, oilseeds and pulses, it might be worthwhile to appoint special Extension Specialists at the District and the State level.

It was pointed out that all the posts required will not have to be additional posts and the States could re-organise existing posts to work towards the objective stated adding the most essential extra posts.

9.13

The Committee has recommended that in larger districts, special sub-divisional Agricultural Officers may be provided in each Revenue sub-Division of a District rather than personal Assistant as in some States. The Committee is of the view that the appointment of Sub-Divisional Agricultural Officer is a better arrangement. The Committee has indicated that a Deputy Director can guide the agricultural work in about 100 to 125 blocks, and the District Agricultural Officers can guide the work of 3 to 4 Sub-Divisional Agricultural Officers, each of whom would look after about 10 to 12 blocks.

Accepted in principle. A further suggestion made by the representative of Madras Government that it would be better to divide a larger district into two districts was also considered feasible.

9.14

Till such time as the supply functions are transferred from the Agricultural Department it would be necessary according to the Committee, to provide gazetted personal Assistants together with the necessary complement of accounts and audit staff, both for the

It was pointed out that the suggestion related to a temporary phase pending the transfer of trading functions to the cooperatives or other agencies. If the trading functions are transferred and the Department is provided with adequate extension

District Agricultural Officers and the Deputy Directors of Agriculture in order to relieve them of routine accounts, bills and supply work.

subject-matter specialists as recommended earlier, D.A.O. may have adequate time to attend to this type of work without separate staff for the purpose.

10.2

The Committee has recommended the establishment of major research stations for serving the needs of each agro-climatic region, equipment and staffed for undertaking research in all branches of agricultural improvement, such as plant breeding soil science, entomology, mycology, agronomy, horticulture etc. District Farms and sub-stations, and crop and irrigation research stations within the region should serve as sub-stations of the regional research stations. The Committee has further expressed itself in agreement with the recommendations with regard to the reorganisation of research work on the rice crop. It would be useful if similar reviews are entrusted by the I.C.A.R. to Experts in the case of other crops so that the lacunae in crop research and its application to the field could be filled up.

The recommendation was accepted. Views were, however, expressed about a tendency on the part of the Centre to encroach on state functions by establishing centrally controlled and staffed regional research stations and other institutions for performing work falling within the States' purview and sometimes already engaging the attention of the States.

It was pointed out on behalf of the Centre that Regional Research Stations dealt with work which did not fall within the sphere of any one particular state and hence had to be sponsored by the Centre because of inadequacy of States funds and personnel. It was agreed, however, that the administration of such institution should be with the State Government and their establishment should be in consultation with the States. It was agreed that the Government of India would look into the question in the light of the views expressed.

Accepted.

10.7

A separate section for carrying on research and teaching work in the field of Agricultural Economics has been recommended in the Agricultural Colleges and Research Institutions.

10.3

The Committee has recommended that there should be one vocational school of Agriculture in each districts imparting practical training in agriculture. The School should be adequately equipped with farms and other training facilities and may run 2 to 3 different types of courses. These schools should have a separate hostel for the farmers to reside during their training period. For the benefit of the practical farmers short

Accepted in principle subject to funds being available.

10.10

courses ranging from two to ten weeks should be organised on growing special crops, poultry keeping, bee-keeping, horticulture, farm management and agricultural machinery depending upon the local demand.

10.12

To relieve the Research Workers in Colleges and Institutions of Administrative and routine accounting duties, it is imperative that in all Agricultural Institutions, there should be properly trained administrative and accounts staff of appropriate status.

Accepted.

CATEGORY D: RECOMMENDATION WITH FAR REACHING FINANCIAL
IMPLICATIONS WITH NO TARGET DATE.

Paragraph Recommendations of the
Reference. Committee.

Recommendation made by
the Conference of the
State Ministers of Agri.

8.15 The Committee is of the view that a programme which seeks to encourage the farmer to adopt better & improved methods of farming should be matched by a suitable credit programme, which will provide the necessary means for the adoption of the new methods advocated. Government policies should be moulded to the needs of the small cultivators and credit facilities extended to them despite the greater risk involved.

It was agreed that the matter should be examined by the C.D. & Cooperation Ministry. The view was expressed that for a successful programme more agricultural credit would have to be found.

CATEGORY E. RECOMMENDATIONS OF THE AGRICULTURAL
ADMINISTRATION COMMITTEE, REQUIRING CENTRAL
ACTION.

The Conference recommended that the Centre should initiate action with which the Government of India were concerned in the light of the conclusions reached with regard to the recommendations falling within the purview of the State Governments.

Financial resources for implementing the recommendations of the report.

It was agreed that the financial implications of the accepted recommendations of the report should be worked out by each State in the light of the decisions.

2. The State Ministers were emphatically of the view that the recommendations could not be implemented during the current year unless the Government of India made cent per cent grant. Further, even with cent per cent grant, the States could not implement the recommendations, if funds would have to be found from the State Plan provision as the State provision has already been committed to most essential items of work which are determined from year to year with the approval of the Planning Commission. On a rough estimate it was thought that the annual expenditure to a particular state for implementing the recommendations might not be more than 13 lakhs. On the whole approximately Rs. 2 crores might be needed during the remaining period of the Second Five Year Plan. The State Ministers suggested that this entire amount should be provided by the Centre as a centrally sponsored scheme so that both the funds as well as the plan provision was provided by the Centre. The States, on their part, would agree to implement the recommendations, and treat the expenditure as committed expenditure during the Third Five Year Plan so that the financial assistance from the centre would not be required during the Third Plan. The State Ministers were assured that although no decision about the quantum of assistance from the Centre could be taken without consulting other Ministers and the Planning Commission, the

P.T.O.

Government of India would try to help the States as much as possible when the States had worked out the exact financial implications.

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The following resolution moved by Sri P. Thirna Reddy, Minister for Agriculture, Andhra Pradesh, - thanking the members of the Agricultural Administration Committee for their valuable work was adopted:

"This Conference of State Ministers and Officers of the Agriculture Department place on record their appreciation of the valuable services rendered by the Agricultural Administration Committee under the chairmanship of Raja Surendra Singh of Nalagarh and drafting a most useful document to serve as a guide to the State Governments and the Central Government."

Item 3(b) Launching of the Kharif Production Drive - 1959.

The approach suggested in the scheme for the Kharif Production Drive - 1959, was generally approved and all the State Ministers agreed to launch a vigorous Kharif Production Drive. The important points emerging as a result of the discussions on some of the items by officials of the State Government of the Campaign are indicated below:-

A. Supply of Improved Seed:- A few State representatives indicated their requirements of improved seeds of crops included in the Kharif campaign. It was pointed out by the State representatives that paddy being a localised crop, its seed requirement from outside a State may not be large. The requirements indicated by some of the states are mentioned below:-

State	Paddy	Maize	Bajra	State from where to be procured:
1. Madhya Pradesh	5000 maunds (N22)	-	-	Uttar Pradesh
2. Punjab	-	-	2000 mds	Rajasthan
3. Rajasthan	10,000 mds (basmati)	-	-	Punjab
4. Himachal Pradesh	-	500 maunds (hybrid maize; US13 or NC37)	-	Uttar Pradesh
5. Bihar	-	5000 mds (Hybrid maize)	-	Punjab

B: Plant Protection measures including seed treatment

In view of the importance attached to the adoption of plant protection measures during the Kharif campaign, the State representatives laid stress on the timely supply of insecticides and pesticides as well as equipment such as sprayers and dusters. It was pointed out by the Plant Protection Adviser that there would be no difficulty with regard to the supply of insecticide and pesticides. However, in view of the increased demand for sprayers and dusters (including power sprayers) over and above the quantities stocked with the State Governments and the Central Plant Protection Units, it was indicated that efforts would be made to arrange licence for

the import of particularly power equipment. The specific requirements for the equipment and insecticides, indicated by the State Governments are as follows:-

State	Insecticides	Equipment	Foreign exchange required
Andhra Pradesh	75 tons of sulphur	-	-
Uttar Pradesh	-	2600 dusters	-
Mysore	1. Agrosan GN 62000 lbs. 2. Sulphur 10 tons	200 power sprayers	Rs.5 lakhs
Madras	-	Sprayers	Rs.2 lakhs
Punjab	-	2000 hand dusters	-
Bombay	-	4000 power sprayers	Rs.15 lakhs
Jammu & Kashmir	10 tons of ceresan	-	-

The Uttar Pradesh representative pointed out that paddy blast not being a serious disease in the State they proposed to take up seed treatment only as a demonstration. To start with, 200 to 400 maunds of seed would be treated in each district. West Bengal on the other hand proposed to treat 20 percent of its entire quantity of pedigree seed before it was supplied to the cultivators. The State representative indicated that an additional requirement of dusters and sprayers worth Rs.3 lakhs, over and above the provision of Rs.7 lakhs made in the State plan during the next year. It was pointed out that efforts would be made to provide equipment to West Bengal from the Central Plant Protection Units on hire basis.

The representative from Mysore pointed out that the State proposed to continue free treatment of seed during the next Kharif season also. For this purpose, he requested the Centre to subsidise the cost incurred by the State Government to the extent of 50 percent. The aerial spraying of crops tried during the Campaign in Bombay had proved a success and the State representative suggested the continuance

of the programme during the Kharif drive with Central assistance. The representatives from Jammu & Kashmir and Andhra pointed to the serious damage caused by maize caterpillar and Deccan grass-hoppers respectively, and wanted Central assistance in taking remedial measures on an extensive scale.

C. Requirement of iron and steel. In view of the pressing demand from the States for iron and steel, particularly in the context of the production campaigns, it was announced that a decision had been taken to allot hundred percent additional quota of iron and steel over and above the normal allocation for each State. It was, however, made clear that the additional quota should be utilised exclusively for the purpose of the next Kharif campaign. The State representatives pointed out that they had not received the iron and steel allotted as far back as 1956 and unless the procedure was suitably revised and a better understanding reached with the Iron and Steel Controller, Calcutta, who has to release the material, no useful purpose would be served by increasing paper allotments. It was decided that a meeting of representatives of the State Governments who are experiencing difficulty in the procurement of iron and steel would be arranged with the Iron and Steel Controller in the near future so that the bottlenecks could be removed and a suitable procedure evolved. At the meeting which would be held in Calcutta a procedure would be evolved for obtaining the allocated quantities of iron and steel in time for manufacturing implements instead of allocatings remaining only on paper as hitherto.

D. Green Manuring: The State representatives were requested to pay special attention to the programme of green manuring during the Kharif drive. The representative from Uttar Pradesh pointed out that they proposed to cover 10 million acres of monsoon fallow with green manure (Sanai, Moong & Dhaincha) during the Kharif season. While the State did not require any seed of Moong and Dhaincha, the demand for 4,000 tons of sanai seed was made by the State representative. Andhra Pradesh agreed to supply two to three thousand maunds of sannai seed to Uttar

Pradesh. The Uttar Pradesh representative was asked to get in touch with the Andhra Pradesh Government for procurement of this quantity of seed. Punjab, on the other hand, needed 2,000 maunds of dhaincha seed, which Bihar promised to supply. The representative from Madhya Pradesh laid stress on the scope for green leaf manuring, specially in areas adjoining forests. He pointed out that they had already covered 3,000 acres during the last year, and would continue to intensify the programme during the next season.

Dr. Ramaiah suggested that some of the plants like *Xanthium Sttoumarium*, *Croton Sparsiflorus* and *Cassia Torea* which were found all over the country could profitably be used for green manuring on a large scale by the different states.

E. Fertilisers: It was pointed by the Centre that the quota of nitrogenous fertilizer allotted for the quarter ending March, would be supplied to the State Governments before the end of May, 1959. In addition, an effort would be made to supply 40-45% of the quota allotted for the quarter ending June, 1959, by the end of May. The additional allocations for the two months of April-May are indicated below:-

STATE	AMMONIUM SULPHATE	URES
	(tons)	(tons)
Andhra Pradesh	22,000	6,100
Assam	1,200	150
Bihar	8,000	1,500
Bombay	22,450	8,100
Delhi	120	20
Himachal Pradesh	200	-
Jammu & Kashmir	270	-
Kerala	2,000	450
Madhya Pradesh	16,000	750
Madras	4,400	1,462
Manipur	20	20
Mysore	4,800	3,000
Orissa	4,000	375

Pondichery	330	-
Punjab	2,400	-
Rajasthan	400	185
Uttar Pradesh	20,000	1,800
West Bengal	4,000	2,250

F. Agricultural Credit: The State representatives indicated their additional requirements of short term loans for purposes connected with the Kharif production Campaign as under:-

State	Short term loan (in lakhs)
Andhra Pradesh	Rs. 13
Assam	40
Rajasthan	(to be intimated later)
Uttar Pradesh	55 (excluding loan for fertiliser)
Mysore	160
West Bengal	2
Bihar	30

It was agreed that an effort would be made to meet the additional requirements in full.

G. It was unanimously felt that the success of any production drive would depend upon two factors which should receive increasing attention: (i) the supply of the full requirement of chemical fertilisers and (ii) provision of a suitable price incentive. While appreciating the efforts made by the Centre in trying to procure more and more chemical fertilisers in spite of serious shortage of foreign exchange, the conference felt that particularly in production drives relating to Kharif, it would be meaningless to exhort the farmers to produce more without giving them the most important means of production viz., fertilisers. The need for advance planning in this regard, taking into account the continuous increased demand for fertilisers and not only the past allocations which have been reduced from year to year, was also emphasised. Further, it was pointed out that in view of increasing demand for foodgrains on account of a steady rise in population as well as in the standards of living, the Rabi and Kharif Production Drives, would be a continuous matter. While various measures could be P.T.O.

continuous feature. While various resources could be mobilized for a crash programme in a particular season, such continued production drives would require long term planning to meet the full requirements of the farmer. No farmer would produce more unless he is assured of a reasonable price as more production and less price would not be an incentive for the farmer to produce more. The need for announcing proper prices much in advance of sowing with regard to the crops selected for production drives, was strongly emphasised.

Keeping the above considerations in view the following resolutions were adopted:-

RESOLUTION-I : "Supply of Fertiliser".

"The Conference of the State Ministers of Agriculture, fully realising the important role of chemical fertilisers in increasing the food production, notes with satisfaction the increasing use of fertilisers by the farmers and while appreciating the efforts of the Central Government, despite the foreign exchange difficulties in importing large quantities of fertilisers, wishes to draw the attention of the Centre to importing more fertilisers. The Conference hopes that the Central Government will make every effort to meet the growing needs of fertilisers by direct purchase, barter or other arrangements from abroad until such time as fertilisers are produced inside the country in adequate quantities."

RESOLUTION - II : "Price Support".

"The Conference of State Ministers feels that one of the important measures for increasing production and maintaining it at a high level is to provide a fair price to the producer. The Conference wishes to recall a resolution passed in this regard while considering the report of the Grow More Food Enquiry Committee and requests the Government of India to take adequate steps to assure a fair price to the producer after taking into consideration all aspects of the problem".

Item No. 3(c) Launching of a mass Rat Eradication Campaign.

There was a general agreement on the need to organise intensive Rat Eradication Campaign as suggested in the note circulated on the subject. It was, however, felt that such Campaigns should form an integral part of the plant protection measures which need to be adopted on an intensive scale during the Food Production Drives and the State Governments would take appropriate action.

Item 3 (d) MEASURES FOR INCREASING OILSEEDS PRODUCTION.

In the meeting of the State officials, which was held during the State Ministers Conference, Shri K.R. Damle, Secretary, Department of Agriculture, Shri K.B. Lal, Additional Secretary, Ministry of Commerce & Industry and Dr. M.S. Randhawa Vice President, I.C.A.R. appealed for special attention towards greater production of oilseeds, particularly groundnut and castor, to enable the country to earn more Foreign Exchange and in return be able to import more of the much needed fertilizers.

2. Shri Damle stated that except for 3 or 4 States, the yields of oilseed crops were going down. He referred to the paper distributed in this connection and requested the States to make greater efforts for increasing the area as well as the yields of oilseed crops, particularly groundnut and castor, so that there could be scope for export.

3. Shri K.B. Lal pointed out, that oilseeds were in greater demand in foreign markets and, that it was necessary to increase export of oilseeds, in order to earn foreign exchange, which was so acutely needed for the implementation of the industrial plan. Referring to the views expressed earlier against the export of oilseed cakes, he pointed out that, according to experts, three times more nitrogen was available for the same value from chemical fertilizers which could be imported. He further mentioned, that the quantity of oilseeds proposed to be exported, which was to the extent of about Rs.50 crores, was not much as compared to the total quantity that was now being produced, or the potentialities that the country had for the production of oilseeds. He appealed to the States to make special efforts for increased production of oilseeds for export, so that, the foreign exchange thus earned, could be utilised in return for the import of fertilizers.

4. Dr. M.S. Randhawa stressed the need for increasing the area as well as per acre yield of oilseeds in the various states. He stated that the Oilseeds Committee in the I.C.A.R. had formulated special schemes to encourage increased production of oilseeds and had provided for grant of subsidy for pesticides at Rs.5/- per acre. The Committee, he stated, was prepared to help the States with Power Sprayers and mentioned, that the States could conveniently coordinate oilseeds protection activities with the general Plant Protection Schemes and supplement their funds from the subsidies offered by the Indian Oilseeds Committee. He also suggested multiplication of improved seeds in the Blocks and Seed Multiplication Farms and advised allocation of fertilizers for increased production of oilseeds. He further mentioned about the possibility of bringing waste lands and marginal areas under cultivation of oilseeds crops in addition to the possibility of growing them as border crop. In his opinion, while some states had made good progress, more efforts were needed in Andhra Pradesh, Bihar, Madhya Pradesh, West Bengal and Rajasthan. He requested the Rajasthan representative to formulate scheme for production of castor seed in canal irrigated areas and to submit to the Oilseeds Committee for financial assistance.

5. The representative of Andhra Pradesh stated that the yields of Oilseed Crops had gone down in the State mainly because of pests and diseases. The adoption of Plant Protection measures for these crops involve high cost. The representative of the West Bengal indicated that the state proposed to utilise certain new areas to be reclaimed in Midnapur, Birbhoon and Bankura districts for raising groundnut. The representative from the Government of Bombay mentioned that they had earmarked 5 lakh acres out of a total area of 55 lakh acres under groundnut for intensive effort. The State Government had made a request for 4 plant protection units and for about 5,000 tons of super-

phosphate in addition to the State's normal requirements and hoped that this would be made available to them. The representative of Madras Government mentioned that as against the plan target of 1,60,000 tons of oilseeds, they had achieved the production of about 60,000 tons and hoped to fulfil the target by the end of the plan. He suggested that subsidy for wells, which now was restricted only to Blocks, should be extended to the non-block areas also for growing oilseeds. The representative of Mysore Government made a plea for the fixation of remunerative floor prices for oilseeds and promised to make an all-out effort for increased production. The representative from the Punjab Government envisaged considerable scope for increasing the production of groundnut, primarily by growing it as an inter-crop on better types of soil.

6. Concluding the discussions, Shri K.B. Lal, Additional Secretary, Ministry of Commerce and Industry, pointed out that, while the potentialities for increasing area as well as yields for oilseeds was great in the country, the gap between the actual production and the target appeared to be considerable. This, he felt, was mainly due to the administrative bottle-necks. He hoped, that if officers from the I.C.A.R. and Indian Oilseeds Committee went round the states to obtain first hand knowledge and to remove these bottle-necks, there would be considerable progress in the direction of increased production. He urged that, in view of the acute need for foreign exchange, it would be worthwhile to make an all-out effort to augment production for increased export (Speech of Shri K.B. Lal appended).

7. It was agreed to take the following measures:-

- 1) Each State concerned with oilseeds production would urgently prepare suitable schemes for stepping up substantially the production of oilseeds, particularly groundnut and castor and forward the same to the Secretary Oilseeds Committee for financial assistance:

- 2) The oilseeds Committee would send suitable officer to the States concerned to finalise the state scheme to be put into effect urgently;
- 3) The Ministry of Commerce will be kept informed of the action taken.

The Minister for Food & Agriculture in his concluding remarks thanked the State Ministers of Agriculture and the other representatives for the valuable contribution they had made in arriving at realistic conclusions both with regard to the Report of Agricultural Administration Committee and the Scheme relating to the Kharif Production Drive. He briefly reviewed the efforts made by the Government since the Report of the Royal Commission on Agriculture for alterations and modifications in the Agriculture Departments of the States. He thought that although many recommendations had been made in the past the Departments of Agri. had not been streamlined to meet the developing economy and steadily increasing demand for food production. He suggested that the implementation of most of the recommendations made by the Agricultural Administration Committee would fulfil a real need and the State Governments should make every effort to implement not only recommendations involving no financial implications but also the other recommendations for which both the States and the Centre should jointly endeavour to find the funds. He emphasised that the matter was so urgent that it would not be delayed till the beginning of the Third Five-Year Plan and would require to be implemented forthwith. He had no doubts that the Planning Commission and the Finance Ministry would adopt a liberal attitude towards the recommendations. Fully appreciating the difficulties expressed by the States with regard to finding additional funds during the balance of the Plan period, the

Minister thought that if agriculture, as suggested by every one, is not to be given a secondary place, the State Governments should do their best to find additional funds and the Centre on its part would do everything to help them till such time as the expenditure could be regarded as committed under the Third Five-Year Plan.

Referring to the Kharif Production programme the Minister made a brief review of the progress made for increasing the food production to meet the ever-increasing demand for foodgrains as a result of the steadily increasing population and the rise in the standards of living. While commending the efforts put in by the State Agricultural Departments in the matter of raising the production of both the food crops and the commercial crops, about which the Departments could legitimately take pride, he made a fervent appeal for concerted action in raising production during the Kharif. He suggested to the State Ministers that the difficulties experienced and mistakes made during the Rabi production Drive should be overcome and the machinery geared up for an impact programme in view of the ambitious target for doubling agricultural production by the end of Third Five-Year Plan. He thought that the achievement of such a target was possible. The production of a progressive farmer per acre is 6 to 8 times that of a poor farmer. If the poor farmer could be helped to increase his production by 50 or 100% it would be possible to achieve the national targets. He referred briefly to the need for popularising plant production measures and for technological improvements which alone could sustain agricultural production at higher levels. He made an appeal to the Scientists to concentrate more on the farmer and applied research that would be of immediate importance to agricultural production. He thought that the scientists of all categories should reorientate research to subserve the

real need of the agriculturists and make a genuine effort to mix with the farmer, understand his problems and the conditions under which he is working and help him to adopt improved agricultural practices. Finally, he appealed to the State Ministers to join hands together, pool the resources and make a determined effort to fulfil the great task which the nation has entrusted to them.

Dr. K.N. Katju, Chief Minister of Madhya Pradesh, thanked the Minister for Food & Agriculture on behalf of the State Ministers of Agriculture for summoning the Conference, presiding over it and guiding its deliberations for arriving at realistic conclusions. He assured the cooperation of all the States in joining hands with him for raising food production to the desired level.

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APPENDIX

INAUGURAL ADDRESS BY SHRI A.P. JAIN,
MINISTER, FOOD & AGRICULTURE AT THE
CONFERENCE OF STATE AGRICULTURAL
MINISTERS HELD ON 6TH FEBRUARY, 1959.

It is with great pleasure that I extend to this distinguished gathering a warm welcome. I wish to convey my appreciation and gratitude to all the State Ministers and other representatives who have been able to find time to be with us here.

2. We have almost established a procedure by now that whenever something important in the field of food production has to be considered, the State Ministers are consulted in a Conference so that I could take counsel with them and arrive at decisions with maximum unanimity. The present Conference has been convened primarily to consider the Report of the Agricultural Administration Committee which is a significant document having a direct bearing on our food production efforts. Those of you who were present at the Conference of State Ministers of Agriculture held in Srinagar in October, 1957, will recall that views were expressed about serious delays in the execution of agriculture production schemes in the States due to administrative complexities and over-centralization of powers, both administrative and financial. The Conference suggested to the Govt. of India to set up a Committee which should visit a few States and recommend for the consideration of the State Governments a model agricultural organisation in the States as well as measures for delegation of powers to agricultural officers at all levels so that the staff of every category are given responsibility with adequate authority for carrying out the programme of work entrusted to them. The Govt. of India accordingly appointed the Agricultural Administration Committee with Raja Surrender Singh as its Chairman. The Committee was formally established at the end of February, 1958 and it is commendable that it submitted its report by October. The committee's recommendations have been well received in the press and by the public and it is now for the State Governments to implement the accepted recommendations.

3. The Agriculture Secretary, the Director of Agriculture and the Registrar of Co-operative Societies in each State served as co-opted members with the Committee and the draft report of the Committee, before finalisation, was thoroughly discussed with State representatives.

and their opinion and practical suggestions obtained. The recommendations of the Committee, therefore, are not new to most of the members who have assembled here and in fact they have played their part in shaping the recommendations.

4. I am given to understand that in the Group discussions held in Delhi during the past few months to discuss the State Plans for 1959-60, every State has made a token provision in its budget for expenditure relating to the implementation of this report. This is a step in the right direction because the accepted recommendations can be quickly implemented if additional funds could be reappropriated to augment this token provision.

5. This special Conference has been convened so that we could arrive at policy decisions on the important recommendations to enable the officials to work out details for speedy implementation.

6. We have already made a preliminary study of the recommendations & classified them under different categories which have been communicated to the State Governments in order to facilitate examination at their end. I take it that most of you present here would have conducted a similar review which can form the basis of our discussion for arriving at concrete conclusions. The recommendations fall particularly under two broad categories, viz., those which involve no financial implications and, therefore, could be implemented without any delay, provided they are otherwise sound and acceptable. The other recommendations which involve financial implications might require a little more consideration particularly in regard to the sources from which the expenditure could be met. The recommendations having no financial implications relate mainly to procedural matters, delegation of powers to officers at different levels, simplification of budgetary procedures and expenditure sanction, framing of rules for the different posts, revision of service rules direct recruitment of officers in order to inject fresh blood, promotions based on merit, co-ordination of action between the irrigation, development and agricultural departments & in short, measures for gearing up agri. administration to meet the developing need of agri. production programmes. There is need to concentrate more on the man behind the plough than on paper. I am sure you will agree with me, that this is the time for the administration and staff to be thoroughly re-orientated to give first priority to an impact action programme for higher production.

7. The recommendations which involve additional expenditure to Govt.

relate, among other things, to the building up of key personnel, removing of dead wood in the Departments, need for better service conditions, provision of more opportunities for the staff of agricultural departments, departmental tests with necessary incentives for the staff to be in a state of continuous preparation for better work, insti-

tution of training facilities for staff, proper programme planning and separation of what are called the 'trading functions' from scientific and educational work related to farming. We have not been able to make any appraisal of the expenditure that may be involved in the acceptance of some of the salient recommendations of the Committee. No one will disagree that a contented and competent staff is a pre-requisite for a dynamic agricultural administration. At first sight, it might appear that the acceptance of the recommendations of the Committee in regard to service conditions would involve substantial expenditure but it should not be forgotten that with the improvement in service conditions, the output and quality of work would improve and a fewer efficient and contented persons may do more work than what many less-qualified and frustrated persons are doing now. Moreover, it is not necessary that in the higher scales recommended by the Committee all the existing staff should be automatically fitted in. It follows, that in the new scales officers should be appointed only if they have the necessary competence to fill the higher posts. In other words, there should be proper screening so that only those who have the necessary qualifications, aptitude and competence are given higher scales. It can also be expected that the revised scales would attract suitable direct recruits who should be prevented from falling into a state of routine working and stagnation by prescribing periodical departmental tests as a part of their conditions of service. If these measures are adopted the actual expenditure involved in bettering the service conditions in the agricultural departments would not be so high as it would seem at first sight. Similarly, we have made suggestions, how in each cadre selection grade posts could be provided for appointment of really competent officers on merit without increasing very much the cost of cadre.

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8. One of the important recommendations is for the establishment of an All-India Agricultural Service on the lines of the Service that existed in the past. You all know that in order to raise the morale of the staff and to get better type of personnel we have instituted an All-India Administrative Service. Efforts are being made with regard to the creation of All-India Services in some other fields. The formation of such a service will require the consent of the State Governments. It will also involve the pooling of posts, additional expenditure on account of the difference between the Central and State Service scales of pay and central control of the Service. If you are convinced about the merit of having an All-India Service with Officers who could be interchanged and who would acquire knowledge and experience of agricultural conditions on an All-India basis, then financial considerations should not stand in the way of the formation of such a service.

9. I would also like to draw your attention to another basic recommendation of the committee that the Agriculture Departments should be relieved of what are termed 'trading functions'. These functions should normally be discharged by the Co-operatives and wherever the co-operatives are not in a position to take them over immediately, work of this kind should be assigned to other non-technical staff, leaving the scientists and the agriculturists to do the technological and educational work. It is a waste of national talents, if the scientists and the technologists are diverted to administration and trading to the detriment of scientific functions. Technological improvements will have to play a positive role in our programme of food production if we desire to keep pace with the demands of food needed for the increasing population and higher standards of living. This would be possible if the scientific and the technological staff are given unstinted opportunity to utilise their talents, experience and knowledge in educating millions of farmers. If the staff of Agriculture Department is mobilised and made responsible for the ~~Extension work on the lines~~ suggested by the Committee, I am sure that the activities of our ~~scientific and research~~ Contd....

institutions could be related more directly to food production and raising the farm output. I would request you to consider this part of the recommendation dispassionately and to suggest practical measures to ensure that scientific and technical personnel of the agriculture departments are utilised for the purpose for which they are trained.

10. I would now draw your attention to the second important item on our agenda, namely, the Kharif Production Drive. With your co-operation, the intensive Rabi Production Drive has proved a success. Although it was started a little late, the co-ordinated effort put in by the different agencies has given the assurance that we would look forward to a good Rabi harvest. Encouraged by this success, I have already addressed you forwarding the outline of a Kharif Production Campaign to be launched in all the States. I have no doubt that with proper advance Planning and co-operation of governmental departments, farmers and public men, it should be possible for us to achieve better results during the next Kharif. The need for raising our food production substantially is not an ideal based on sentiments but a hard, practical and over-riding necessity - a condition of our survival and a basic need for the fulfilment of our development plan.

11. No doubt our food production has increased considerably since the inception of the First Plan. Even so, it is a hard fact that this increased production, impressive as it is, is insufficient to meet the growing demands of the increasing population and rising standards of living. Every year we are adding six to seven millions of new mouths to feed and our extra requirement to meet this need alone comes to one million tons of food per year. Moreover, we have to produce more food in order to meet the needs for the rising standard of living. All this extra food must come from our existing acreage of cultivable land. Our yield per acre is one of the lowest in the world but with determination and concerted efforts it can be increased by twofold or even threefold. Everyone of you must

have observed that a progressive farmer produces sometimes as much as six to eight times of what a poor farmer does and given the means, advice and facilities there is no reason why the poorer farmer should not approach nearer to the progressive farmer in production. It is our aim to double our food production. It is our aim to double our food production by the end of the Third Five-Year Plan.

12. The control of population is another problem facing us. We have made some efforts in that direction but, I am afraid, not enough. With the improvement of health and sanitation, luckily the death-rate has been going down but the birth-rate continues at the same old level. In the result, the rate of increase in population which at the last census was estimated at 1.25 per cent per year is now nearer to 2 per cent. The control of population, desirable as it is, is, however, full of difficulties and in the immediate future it does not offer itself as a major factor in the solution of our food problem. We must look for the solution through increased yield per acre. It is in this context that our production drive assumes special importance. I have already requested the States to prepare for the guidance of their workers a Kharif Campaign Guide, more or less on the model furnished by the Centre. The guide should indicate the different operations to be undertaken and the time schedule during which each of the operation should be completed. It should also take into account the available resources and manpower. I have no doubt that within the existing resources much greater progress could be achieved by gearing up departmental machinery for an impact programme of production. Proper co-ordination between the different Ministries and agencies, particularly irrigation, development and agriculture, should be achieved. Departmental bottlenecks experienced during the Rabi production drive, particularly in the matter of sanctioning agricultural credit and supplying the means of production to the farmers should be carefully studied and overcome.

13. The major crops included in Kharif campaign are paddy,

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jowar, maize, bajra and ragi. The States are free to add any other crop depending on its importance in the State. Paddy, however, is our principal crop which accounts for about half the total production of food-grains in the country. Special attention will, therefore, have to be paid for raising rice production.

While all the paddy-growing States have thus a special responsibility, four States particularly viz., Orissa, Bihar, Uttar Pradesh and Madhya Pradesh, which claim about half the paddy acreage in India, will have to play a major role. It is in these States we have the lowest yields of about 500-600 lbs. of rice per acre. If the yields in these States are raised to the level of yields in some of the States like Andhra or Punjab, we may have no problems about rice. These States will, therefore, have to make a special study of the factors responsible for such low yields and intensify the measures to remedy them. Suggestions have been made that if line sowing instead of broadcasting is adopted on a large scale and if the paddy varieties grown are reduced to a few improved ones and if short-term high yielding varieties are extended to larger areas, the average yields could be substantially increased.

14. Nitrogenous fertilisers will have to play an important part in raising our yields, particularly with regard to paddy. Unfortunately, this fertiliser is in short supply. We are making every effort to see that the available fertilisers are transported to the rail-heads between April and June so that the fertiliser allotted to States is supplied in time. The States, in turn, will have to arrange supply-points for the timely distribution of the available fertilisers within easy reach of the farmer. In the context of our shortage of chemical fertilisers, improvement of soil fertility through other measures deserves the highest priority. This may be done by a vigorous drive with regard to green manure and compost making. A number of suggestions have been made in the guide about the practices which may be followed and I would request the

State Governments to give serious attention to these two measures which, if adopted on a large scale, could increase our production considerably.

15. We have been able during the current year to increase the allocation for minor irrigation. The original outlay of 16.6 crores was subsequently increased to 20 crores. In the Development plans for 1959-60 which have recently been discussed with the State representatives, an outlay of about Rs.22 crores has been agreed to for minor irrigation schemes. I hope this larger allocation will help in our efforts to increase agricultural production. It is needless for me to emphasise the importance of maintaining and fuller utilization of the completed works while we are taking up new irrigation. I am glad that some of the State Governments have already passed legislation empowering them to carry out the construction of field channels for taking water to the farmers' fields and recover the expenditure from the beneficiaries. I would urge that other States also may pass such legislation soon.

16. With the reduction of tubewell water rates and the construction of proper channels, there has been considerable improvement during 1958 in the utilisation of tubewell water for irrigation in a number of States. For optimum utilisation, however, it is essential that suitable crop patterns are evolved and introduced in areas commanded by tubewells. The groundwater exploration project, under which exploratory drillings are being made in certain areas, has so far shown that there are great possibilities of tubewell construction in Madhya Pradesh, Madras, Andhra Pradesh, Orissa and West Bengal. I hope, the State Governments will take advantage of the results obtained under this project.

17. The success of our production drive will depend upon the effort put in by the farmer. China is reported to have achieved phenomenal rise in production primarily through the mobilisation of the human effort on a mass scale. In our country too unless the millions of farmers, who are responsible for production are geared to the need for stepping up production, the achievement

would still lag behind. Some of the States like Uttar Pradesh have undertaken a training programme of farmers in 'Gramsahayak Camps'. The training of farmers on a mass scale could be adopted with advantage, by the other States. Such training should be systematic and directly related to improved agricultural practices, manuring, plant protection methods, use of improved implements etc. They should be arranged for a few days before each important field operation so that the techniques learnt in the camps could be subsequently practised by the farmers on the field. Our aim should be to bring simultaneously to such camps thousands and thousands of farmers. Sporadic efforts will not achieve results. While the field Extension staff in each Block should arrange such camps, the scientific staff of the Agriculture Department, Research Stations, Agriculture Colleges should be mobilized to speak and demonstrate to the farmers better farming techniques.

18. We have some recent experience of the benefits which accrued by mobilizing the scientific staff during the Rabi campaign. The time has come that our research workers should leave the ivory-towers in which they are working and concern themselves with the field problems directly related to production. They must be associated directly with the farmer in order to understand his problems and the conditions under which he is working. We should take measures to see that all our scientific workers whether employed in the departments of Agriculture, Agricultural Colleges, Research Institutions or experimental stations, are mobilized during the Kharif campaign to go to the villages, stay with the farmers and help them through demonstrations and advice to adopt improved agricultural practices. Our farmers are not conservative. If they are convinced about any improved practice, they would readily adopt it. It is the system under which we are working that is responsible for the failure to reach the results of research to the door-steps of the farmers. I would request the State Ministers to bring

the research and scientific staff on the farm which will give them an opportunity of understanding field conditions and adjusting their own research to the needs of the farmer.

19. The co-operation of public men and non-official agencies should invariably be invited as they are in a position to stimulate the farmers and to bring home to them the need for increasing production. While the scientist would demonstrate to the farmers improved practice, the people's representatives who are in living contact with the farmer, would create the necessary back-ground and conditions under which technological improvements could be readily adopted by the farmer. These agencies could do much to convey to the farmer the need for self-help and to depend to a large extent on his own resources. There are many fields in which self-help programmes could be practiced such as the exchange of seed amongst the farmers, treating the seed against seed-borne diseases, maintaining compost pits to increase local manurial resources, adopting plant protection measures, cleaning and maintenance of irrigation channels, wells and tanks and other minor irrigation works and the fighting of crop pests like rats. Participation from all such agencies which could supplement governmental efforts should, therefore, be welcomed and encouraged.

20. I would appeal to the Ministers of Agriculture to see that in each successive production programme we achieve more than what was achieved during the previous season. We have already announced sufficient incentives by way of crop competition schemes and community awards for increasing production. The community awards will be directly related to the percentage increase in the total production of food crops. All those districts or States where the total production of food-grains exceeds 15% or more over the average of the past three years will qualify for the award. Each district which is entitled to the award will receive Rs.10,000 and each State Rs.50,000. The community awards could be spent by the State Governments for a purpose which will fulfil the community needs in areas

which have contributed most to raise the production. In each State the highest producing district would also be awarded the "Rajya Kalāsh" and the State achieving the highest increase in the production in the country will be awarded an all-India "Rashtra Kalash". I would request the State Governments to give the awards widest publicity.

21. , Before I conclude, let me say a word of welcome to the members of the Ford Foundation Study Team on food production who are present here today. These members are top-level specialists in different agricultural subjects such as farm management, prices, land economics, land tenure, communications, supplies, credit cooperatives, extension, organisation and methods of training, community development, seed multiplication, Soil and water conservation, water utilisation, rice and wheat production, agricultural demonstration and evaluation. The Ford Foundation, in consultation with us, has been good enough to bring this high-powered team to India to study our production problems and to make suggestions for an intensive agricultural effort during the next few years. These are specialists who have the experience of helping their country to achieve high levels of agricultural production. I am sure they will be in a position to examine our production programmes, study our agricultural problems with a fresh mind and make practical suggestions which we could adopt for raising our own production. I trust that you will give them all the cooperation needed to make their mission a success.

Thank you,

ANNEXURE II

Speech by Shri K.B. Lal, Additional Secretary,
Ministry of Commerce and Industry, regarding
measures for increasing oil seeds production.

I am grateful to you for giving me this opportunity of placing before this meeting of State officers certain reasons and views as to why special attention has to be paid to the growing of oilseeds in the remaining part of the Second Five Year Plan. As you also know, the industrial programme in the second plan cannot be sustained unless we are able to augment our external resources.

During the last one hour that I have been here, I have been driven to the conclusion that an agricultural production programme also needs the support of external resources. It seemed to me that there was a general howl for more fertilisers, and there was a protest that oil cake should not be allowed to be exported even if it means that ammonium sulphate of equal value could be imported. The oil cakes were being permitted to be exported because of the advice of experts, as for the same value you get three times the nitrogen. The order of fertiliser requirements that you have been discussing varies from Rs. 9 to 12 crores, and if all your demands will be met, I presume it will come to about Rs. 15 to 17 crores. At the same time, because of the lower yield and lower output of oilseeds over the last two years, we have ^{on} an average lost in foreign exchange to the tune of Rs. 40 to 50 crores per year, because we have been unable to throw up an adequate exportable surplus of oilseeds. The main kharif oilseeds are groundnut and castor seeds. For both these oilseeds, and for both these oils, there is an increasing demand all the world over. There used to be a premium on Indian oils, but over the last four or five years, because of the production not keeping pace with the increase in domestic consumption, our export policy has been extremely erratic. As a result of the erratic policy, world consumers of oils are beginning to look upon India as an unsteady source of supply. They are beginning to divert their requirements to other countries. Other countries are beginning to look upon this as a good source of their own foreign exchange earnings. If, therefore, we continue in this present position, there is no question of increasing our foreign exchange earning; there will be a question of how much less we shall go on earning from agricultural production. If our foreign exchange earnings continue to decline, there will be no

question of a larger amount of fertilisers, and thus, we shall be getting into a vicious circle, which we shall find increasingly more difficult to break.

So, the point that the Ministry of Commerce and Industry has been urging upon the Ministry of Food and Agriculture, and which finally has been accepted by the Cabinet is that so far as agricultural production is concerned, the point at which the vicious circle has to be broken is oilseeds. When you compare the amount required for export with the amount that is produced in the country, you will come to the conclusion that the total quantity required for earning foreign exchange equal in value to Rs. 50 crores does not bear a high proportion to the total production of oilseeds in the country. But we cannot export even this marginal quantity of a lakh or two lakhs of tons unless the production in the country is sufficient first to satisfy the local demand; because, if it is not sufficient to satisfy the local demand, the prices will rule high; and if the prices rule high, we cease to be competitive in the international market, and even when the Commerce and Industry Ministry allocates the quota for export, the quota remains unutilised because of the non-competitive price level. I therefore, urge on this Conference to consider a substantial increase in the production of oilseeds as one of the principal means of overcoming the hurdles which lie in the way of securing an overall increase in agricultural production throughout the country. It is good that you have gathered here to plan the next kharif production programme, but in so far as the castor and groundnut crops which are standing in the fields are concerned, I am told there could be considerable improvement if pest control measures could be concerted in adequate time.

So we need not think only of the crop which will be sown later but we should also think of the crop which is already sown.

With those general remarks, I think the best way is for the Vice Chairman of the ICAR to talk on this subject and to the extent I can be of assistance, I shall be very glad to do so.

Mr. Chairman, this very useful discussion has revealed a somewhat disquieting situation. The position seems to me that from the agricultural point of view the potentialities for increasing the area as well as for increasing the output are considerable. The gap between the

and actual the achievement is considerable. The gap between target/which has been fixed and which should have been the target fixed may still be even more considerable.

Now, from the discussion it appears that there are certain administrative bottlenecks; also there are bottlenecks born of an approach over the last three or four years, - the central importance of oilseeds in the agricultural production programme not having been recognized to the extent to which it is now recognized, because of our foreign exchange difficulties, a tradition has gone up under which the oilseeds schemes are given the go-by, as soon as there is some difficulty either of an administrative or a financial nature.

It also appears that the same volume of experience has not grown in regard to the securing of increase in the out put of these oilseeds as has grown in the case of other crops, cash-crops or food-crops. If therefore the desired results are to be achieved, a little more concentrated effort seems to be called for than has been possible to be given to this item so far, either at this meeting or at any other place. So, I would suggest, Mr. Chairman, that the only thing we might think we have done at this meeting is that the problem has been thrown out, the difficulties have been identified, the general outlines of solution have been indicated. But, if the States are now called upon to draw up definite production programmes and if the ICAR or the ICOC will go round the State Governments and draw up plans at the State capitals and see that all the bottlenecks are removed or all the necessary aids which are necessary are given, only then, we will be able to expect to reach somewhere within the zone of the target. Otherwise, it seems to me that we will face the same position next year.

I would also make a special plea for special assistance to those who, like Bombay, can make practical use of the assistance that has been given to them in the past. That might provide incentive to the backward areas, just as my own State of Madhya Pradesh which does not seem to attach sufficient importance to utilize the great potentialities which exist in that State, for assisting the programme of larger expansion in the oilseed field.

(Summary of Recommendations referred to in reply to Starred Question No. 81/88 to be answered in the Lok/Rajya Sabha on the 11.2.59/12.2.59).

VOLUME II OF THE REPORT OF THE HIGH
LEVEL COMMITTEE ON FLOODS

SUMMARY OF RECOMMENDATIONS

GENERAL

Introductory

1.1.1. In this Volume, the Committee have laid emphasis on the necessity of preparation of Outline/Master Plans for the various river basins and have suggested the important points to be included in such plans. The flood problems, the measures adopted and suggested in the past, and the general lines of solutions have been dealt with for main river basins. The data so far collected with regard to raingauge, river gauge, discharge, silt observation and surveys have also been reviewed and the lines for future investigations have been indicated.

1.1.2. In response to the Committee's request, a number of suggestions were received from the public. The ideas contained therein have been drawn upon, wherever feasible, in dealing with the problems discussed here.

Surveys and Investigations

1.2.1. At present, there are about 3580 reporting, 84 self-recording, and about 1590 non-reporting raingauge stations in the country. For the size of the country, this number is quite inadequate. There is a greater paucity of these in the mountainous parts of the catchments, particularly lying in neighbouring territories.

1.2.2. After the heavy floods of 1954, efforts have been made to augment the existing network of raingauges. As a result, additional 96 raingauges have been established in Nepal, Bhutan and Sikkim and 19 in the mountainous and sub-mountainous catchments within India.

1.2.3. The India Meteorological Department has drawn up proposals for installing 1257 raingauge stations in the Second Five Year Plan. This, on an average, would give a dispersion of 1 reporting raingauge station for every 277 sq. miles and including non-reporting stations, one for every 212 sq. miles. The target is to have one raingauge station for every 200 sq. miles for the present. Considering the available financial resources, this target is considered reasonably adequate.

1.2.4. At an inter-departmental conference between the Central Water and Power Commission and the India Meteorological Department in 1946, it was decided to have at least 10% of the total number of raingauges as self-recording. The Committee agree with these proposals.

1.2.5. The Committee fully endorse the recommendation of the joint meeting of River Commissions held at New Delhi on 15.7.57, that the various States should collect the information about the location, etc. of raingauge stations maintained by private Agencies and pass on the same to the India Meteorological Department. The Committee emphasize the need of bringing such stations to the same standard of observation and maintenance as the existing reporting stations.

1.2.6. At present there are 780 gauge and 669 discharge sites in the country. This is small for the number of rivers in India. The Committee recommend that each important tributary should have gauge sites near the foothills, in the middle reach and near the

confluence with the main river. On the less important tributaries, for the present, a single gauge on each fixed in the lower reach would do. In addition, the Committee recommend a rapid increase in the number of self-recording river-gauges particularly where continuous record of gauge data are needed and where areas are inaccessible.

1.2.7. For discharge observations, there should be, to start with, at least one site on each important tributary and later on another one near the foothills. The programme for the additional gauge and discharge sites, and also drawing up of detailed instructions for standardization of observation sites and improving the method of observation needs to be drawn up by the State Governments in consultation with the Central Water and Power Commission.

1.2.8. It is recommended that States should accord a high priority for establishing and maintaining gauge and discharge sites, even if it means slowing down some of the flood control works.

1.2.9. At present, there are 348 silt observation sites in the country. This number is inadequate. The Committee recommend immediate installation of further silt sites. Certain recommendations in this regard were made by the Central Water and Power Commission in 1955-56. The ultimate aim should be to observe silt at every discharge site. There is an urgent need to lay down standard methods of observation and compilation of sediment data, and to develop silt samplers suitable for Indian rivers. This should be done by the Central Water and Power Commission.

1.2.10. More than 90 percent of the targeted work of aerial photography and semi-controlled photomosaics of the flood affected regions has already been completed by the Survey of India. It is desirable to repeat such photography at intervals of 10 years.

1.2.11. Longitudinal and cross sections of rivers in flood affected areas are being taken by the States. As the physical characteristics of the rivers keep on changing, such surveys should be repeated at intervals of 10 years. The cross section lines should be marked at site by constructing permanent pillars having bench marks on either side of the river.

Preparation of long range plan for flood control

1.3.1. The earlier efforts at flood control were not well planned. These consisted mostly of short embankments built by private parties. Later the flood control schemes were planned in isolation, divorced from developmental aspects of water resources. During the last decade, emphasis changed to multipurpose schemes; while the latest trend of planning in developed countries is to have "one plan for one river" in order to exploit the available water resources to the maximum extent. Such co-ordinated and balanced plan of basin development has not yet been prepared for any river in this country except, to some extent, by the Damodar Valley Corporation.

1.3.2. After an examination of the few outline plans received by the Committee from the States and discussions with the State Chief Engineers, the Committee have given a broad indication of the contents of a satisfactory long range plan for flood control. This pattern might be followed in preparing future long range plans.

THE BRAHMAPUTRA BASIN

Main features

2.1.1. The region consists mainly of the Brahmaputra and the Barak Valleys. The former is long and narrow, being only about 50 miles wide on the average. The rocks of the hills surrounding

these two valleys are friable and are easily susceptible to fluvial erosion, thereby causing exceptionally high silt charge in rivers. The rainfall in the Brahmaputra Valley ranges from 70" in Kamrup to about 250" in the north-eastern frontier regions, while in the Barak valley, it is about 120". The annual rainfall in the part of the catchment lying in Tibet is very small, being about 11 inches at Gyangtse and about 17 inches at Lhasa.

2.1.2. The Brahmaputra is 1800 miles long and has a catchment area of 2,27,330 square miles. It has numerous tributaries in Assam and West Bengal, some of them being trans-Himalayan rivers of considerable size. During the period 1955 to 1958 for which discharges have been observed, the maximum flood discharge at Gauhati was 21,90,000 cusecs in 1958, the discharge at Dhubri at the western boundary of Assam being of the order of 26 lakh cusecs.

2.1.3. The north-bank tributaries of the Brahmaputra bring more silt because of the erodable nature of rocks in the outer Himalayas, the steep slopes of those hills and the heavy rainfall there.

2.1.4. The Barak, a tributary of the Brahmaputra, rises in Manipur Hills. Its valley is separated from that of the Brahmaputra by the Assam range of hills. This river has a catchment area of about 10,000 square miles at Badarpur. The silt charge in this river is low, and its slope is very flat. The flood level at Silchar, 400 miles from the sea is only about 67 feet above sea level.

The flood problem

2.2.1. Extensive flood damage occurs in Assam almost every year. The per capita annual damage is about Rs. 6 while the damage per acre of net area sown is Rs. 7, being the highest in the country. Of the total annual flood damage in the whole of India, Assam accounts for 12 per cent. The damage to crops is two-thirds of the total flood damage in the State.

2.2.2. The Brahmaputra valley is narrow, the width at most places varying between 50 and 55 miles. Of this narrow width, the river itself occupies four to six miles, forests cover a few miles mostly along the foothills, tea gardens occupy higher areas and the remaining width of the valley occupied by populous villages and cultivated fields is indeed small. When this narrow strip gets flooded, the problem becomes serious.

2.2.3. Assam is subject to severe and frequent earthquakes, which cause numerous landslides in the hills and upset the regime of the rivers. The earthquake of August 1950 brought enormous quantities of silt and detritus into the Brahmaputra. In consequence, the river bed has risen in its upper reaches. The river has become more unstable and erosion has increased. As the silt and detritus accumulated in the upper reaches move down, increased erosion is to be expected in the lower reaches in Assam.

2.2.4. The Brahmaputra is pushing southwards practically along its entire length in Assam. This seems to be helped, if not entirely caused, by the excessive silt which is brought into the river by the north-bank tributaries. The erosion, in consequence, is generally more serious along the south bank in Assam.

2.2.5. The tributaries of the Brahmaputra, have raised their banks, thus creating subsidiary valleys between adjacent tributaries. Because of inadequate and inefficient drainage of these low-lying areas, considerable flooding is experienced in these valleys.

2.2.6. The steep north-bank tributaries have flood problems mostly in their own lower reaches, while the south-bank tributaries with their flat gradients spill practically along their entire length in the plains. When the Brahmaputra is in flood, water

heads up in these tributaries causing considerable flooding in their own lower reaches.

2.2.7. The tributaries, particularly on the north bank, tend to change their course in the upper reaches from time to time by throwing out a spill channel during high floods, which if it remains unchecked, develops into the main course of the tributary.

2.2.8. The tributaries are also eroding their banks, but not to such an alarming extent as the main river. In 1956, while about 100 acres of land got eroded on the tributaries, 5,000 acres were carried away on the Brahmaputra itself.

2.2.9. The flood problems of the Brahmaputra valley in Assam thus are

- (i) Flooding along the main river in its narrow valley,
- (ii) Bank erosion on the main river and to a lesser extent on the tributaries,
- (iii) Flooding along its tributaries,
- (iv) Changes of course of some of the tributaries.,
- (v) Inadequate land drainage.

2.2.10. The low and flat Barak valley presents a serious problem. During heavy floods, the river starts spilling, on emerging from the hills at Lakhimpur, the depth of spill gradually increasing downstream. This spill spreads out over the low lands from foothill to foothill. When the Barak is in floods, it backs up the tributaries at their outfalls and makes them spill their banks in turn. The problem of the Barak is thus mainly of bank spilling. There is the problem of inadequate land drainage also, owing to the flatness of the land.

2.2.11. The tributaries of the Brahmaputra flowing through West Bengal have to carry discharges much in excess of their bankful capacity. Also, they bring down colossal quantities of debris and sediment from the easily erodable outer ranges of the Himalayas. North Bengal, like Assam, is also subject to frequent and severe earthquakes which cause numerous landslides. Debris from these landslides, as also from sheet erosion, pours into the various rivers during rains, ~~choking~~ their channels and raising their beds. Matters have been made worse during the past few decades by large scale deforestation in the hills on account of increasing pressure of population and the shifting cultivation practised by the tribes in that area.

2.2.12. The flood problems of North Bengal are

- (i) Spilling over banks resulting in flooding of areas,
- (ii) Bank erosion,
- (iii) Rising river beds due to deposition of detritus and silt,
- (iv) Change of river course from time to time.

2.3. Review of measures undertaken so far.

The Committee consider that the works carried out both in Assam and North Bengal since 1954 have generally been in the right direction.

Lines suggested for future measures

2.4.1. On the Brahmaputra and its tributaries in Assam, resort has mainly to be made to the construction of embankments and the improvement of land drainage for a speedy and economical solution of the flood problem. Storage dams for moderating floods on the tributaries should be built on a multipurpose basis when economically justified. Anti-erosion measures for protecting valuable property will need to be considered on merits of each case. Immediate steps should be taken to ensure that the catchment areas of the various rivers do not deteriorate further through faulty land use and indiscriminate destruction of forests. The catchment areas should be improved by taking soil conservation measures to the extent which the resources permit. The various tributaries should be watched for any tendency to change their courses and timely action taken to discourage such tendency wherever noticed.

2.4.2. In the Barak Valley, flood moderation through storage reservoirs not having been found feasible, the flood control measures may comprise the construction of embankments, ~~by means~~ ^{improvement} of land drainage and channel improvement by means of cutoffs. The low-lying areas may be reclaimed by regulated siltation.

2.4.3. The basic remedy for the rivers of North Bengal lies in extensive and intensive soil conservation measures in their catchment areas. As this would take considerable time to execute and to show results, construction of embankments and river training works may be resorted to for meeting immediate local problems. The tributaries should be watched to prevent sudden changes in their course.

Review of available data and suggestions for the future

2.5.1. Up to the end of November, 1957, there were 157 reporting, including 5 self-recording and 53 non-reporting, rain gauge stations in the Brahmaputra basin and 35 reporting, including 1 self-recording and 3 non-reporting stations in the Barak and other minor river basins.

2.5.2. The India Meteorological Department proposed to set up 98 rain gauge stations including 24 self-recording stations in the Brahmaputra basin and 4 stations including 3 self-recording in the basins of the Barak and other streams in the Second Five Year Plan. After installing all these stations, there would be on an average one rain gauge station for 4370 sq. miles in the trans-Himalayan Brahmaputra basin. In the basins of the Subansiri the Manas and the Barak, the average area per rain gauge station would also be large, being between 400 and 600 sq. miles. In spite of the difficulties of terrain, communications and inaccessibility, further efforts should be made to have a closer network of rain gauges in these basins. The position in the case of Brahmaputra valley and the Teesta basin would, however, be satisfactory.

2.5.3. At present, there are 123 gauge, 90 discharge and 75 silt sites in the Brahmaputra basin and 4 discharge and 1 silt sites in the Barak Basin.

2.5.4. The hydrological investigations in Assam and North Bengal are being carried out comprehensively and in right direction. These, if continued, together with the new sites already proposed in the sanctioned estimates, would generally be adequate for the present requirements of flood control. Further intensification would, however, be necessary for future development of water resources. Where it has not yet been possible to start silt observations at any discharge site, it should be done now.

2.5.5. The Survey of India have completed the programme of Aerial photography and photomosaics in Assam and North Bengal. Longitudinal and cross sections of the main rivers and their tributaries have also been completed in Assam and are in progress in North Bengal.

2.5.6. Aerial photography for unstable reaches of rivers should be repeated at intervals of 5 years, while for ~~the rest~~ *the rest* at intervals of 10 years, to ~~show~~ changes that may take place.

Acute flood problems and lines for their solution.

2.6.1. None of the flood problems referred to the Committee by the Chief Engineer, Flood Control, Assam, really falls under the category of acute flood problems. Nevertheless, answers have been furnished as far as possible.

2.6.2. The Special Engineer, Floods and Flood Control, West Bengal, has not referred any particular acute problem to the Committee but has desired them to examine the flood problems of one of the major rivers of North Bengal. In Chapter IV of Part II, the lines on which the flood problems of this area should be tackled have been given.

THE GANGA BASIN

Main features

3.1.1. The Ganga basin is bounded on the north by the Himalayan ranges, on the south by the Vindhya mountains, on the east by Pakistan and on the west by the Punjab and Rajasthan. It comprises States of Delhi, Uttar Pradesh, Bihar and parts of the Punjab, Himachal Pradesh, Rajasthan and West Bengal.

3.1.2. The normal annual rainfall in the basin varies from about 25" to 70". More than 80 per cent of it falls during the monsoon season i.e. June to September. The rainfall increases from west to east and from south to north.

3.1.3. The Ganga, rising in the Himalayas, has a total length of 1,557 miles and a catchment area of 4,14,313 sq. miles. Its maximum observed discharge at Farakka is 21,25,000 cusecs. It enters Pakistan at Lalgolaghat. It has numerous tributaries within the basin. The intensity of the silt charge in the Ganga is not excessive and the inundation is confined only to a few places.

3.1.4. Generally, the tributaries of the Ganga which have flood problems are those which rise in the Himalayas. The important tributaries in Uttar Pradesh are the Ranganga, the Yamuna, the Ghagra, the Sarda and the Rapti, in Bihar they are the Gandak, the Burhi Gandak, the Bagmati, the Kamla and the Kosi, and in West Bengal they are the Mahananda, the Bhagirathi-Hooghly, the Mayurakshi, the Ajoy, the Jalangi, the Danodar and the Dwarkeswar-Rupnarayan.

The flood problem

3.2.1. The flood problem in the basin increases from west to east and from south to north. The problem in Rajasthan is not acute.

3.2.2. The Punjab

Whenever the Yamuna is in flood, water in the reach between Tajewala and Punjab-Delhi border spills over and submerges low areas. Due to poor drainage occasional heavy rainfall causes flooding. Sometimes, heavy rainfall synchronises with

spilling from the river, and thereby aggravates the flooding.

3.2.3. Delhi

The construction of marginal embankments and spurs, has greatly eased the problem of floods in Delhi city from the Yamuna. Some agricultural lands lying upstream of Wazirabad Pumping Station and these above Okhla Headworks get flooded by river spills during high floods. The city suffers from an acute problem of town drainage at times of heavy rainfall.

Uttar Pradesh

3.2.4.1. The flood problem in the North Western Districts arises due to:

- a) Heavy precipitation in the Himalayan regions, causing floods in the major rivers such as the Yamuna and the Ramganga.
- b) Abnormally heavy rainfall in the area itself where the natural drainage lines fail to drain away the flows.

3.2.4.2. In the Eastern Districts the floods are more frequent, of longer duration, and of ~~higher~~ magnitude. Flood problems here are created both by the major as well as the minor rivers. One of the most important flood problems in respect of villages situated within the flood course of some rivers.

Bihar

3.2.5.1. North Bihar has serious flood problems. The river spill over their banks almost every year, and avulsions are exhibited by several of them. Besides, heavy floods in the Ganga result in flood locking in all the tributaries, such conditions occurring frequently, when floods in the Ganga and its tributaries synchronise. South Bihar has no serious flood problem.

West Bengal

The area of the State lying within the Ganga Basin is not subject to frequent or major floods. However, in exceptional years major floods do occur in this region.

3.2.6.1. The Mahananda has a steep slope and brings down a fairly heavy quantity of sediment during monsoon season, which leads to siltation of the bed, changes in the river course, spilling over banks and erosion at several places.

3.2.6.2. Due to reduction of upland water supplies from the Ganga, the sea tides have become more effective in the lower reach of the Bhagirathi in bringing up silt and depositing the same on the river bed. This has resulted in increase of flood heights, which cause inundation of the low-lying areas. Besides there is bank erosion at many places along its entire length. The reduction of upland supplies has also affected the natural flushing of the dead and dying rivers of West Bengal, has increased drainage congestion and thus has contributed markedly to the flood hazards in West Bengal.

3.2.6.3. Due to gradual decrease in the flood absorption capacity of low marshy tracts in the Mayurakshi-Dwarka river system brought about by siltation and construction of reclamation bunds, the river spills tend to inundate larger areas. If the Bhagirathi also happens to be in flood, the water heads up and more area get submerged.

3.2.6.4. The Ajay carries a lot of silt which is raising its bed. Besides, the low-lying areas which are protected by embankments get flooded when they breach. Flood plain utilization causes considerable drainage obstruction. The discharging capacity in the tail reach is affected by the water levels prevailing in the Bhagirathi.

3.2.6.5. The Damodar carries large quantities of silt and therefore tends to change its course and erode its banks in the upper reaches.

3.2.6.6. The Rupnarayan and the Kangsabati spill in their upper unembanked reaches.

3.2.6.7. Human encroachments on the Jalangi river, have led to increased flood heights and spilling over the banks. Besides there is occasional flood locking due to simultaneous flood in the outfall channel viz. the Bhagirathi.

3.2.6.8. The main problem of the Sunderbans is poor drainage, arisen due to premature reclamation of culturable areas by means of embankments. Silting has been taking place in the channels and creeks with consequent rise of tide levels above the general country level outside the embankments.

Review of the measures undertaken so far

3.3.1. Prior to 1954, some embankments were constructed in some of the States for local protection. The major programme of embankment construction was however carried out in West Bengal where a total length of about 2,200 miles was constructed in Sunderbans and 161 miles on the Damodar. Similarly about 100 miles was constructed on the Gandak in Bihar State.

3.3.2. In the Punjab, construction of some new embankments and strengthening of old ones on the right bank of the river Yanuna has been completed since 1954.

3.3.3. In Delhi State, a programme of construction of new embankments, strengthening of old ones, construction of spurs, and provision of outfall regulators on nalas, has been under execution on the right bank of the Yanuna, to protect Delhi city and its suburbs. On the left bank of the Yanuna, construction of new embankments and strengthening of old ones has also been completed to protect Shahdra town and several refugee colonies.

3.3.4. In Uttar Pradesh, schemes for protection of Varanasi ghats, provision of bunds along the Ganga, the Gandak, the Ghagra and the Sarju, strengthening of old embankments on the Rapti, together with protection of about 4,000 marooned villages in the flood plains of the Ghagra, the Rapti and the Ganga mostly by raising their plinth levels have been undertaken in recent years. Besides, a large number of drainage improvement schemes have been taken up. The works executed so far have afforded protection expected of them.

3.3.5. In Bihar, schemes for strengthening and raising of old embankments and construction of new ones have been completed or under execution on the Ghagra, the Gandak, the Burhi Gandak, the Bainti Balan, the Bagmati, the Karla and the Kosi. Some other Adhwara streams are also being canalised and embanked. Town protection works of Chapra, Sanastipur and Patna have also been completed. The works so far constructed have afforded protection expected of them.

3.3.6. In West Bengal, a number of dams have been completed, or are nearing completion on the Damodar River system.

3.3.7. There were no flood committees or experts appointed in the States of Punjab and Delhi as their problem was not considered serious. In the States of Uttar Pradesh, Bihar and West Bengal, the problem was studied and reported upon by a number of experts, flood conferences and committees.

Lines suggested for future measures

The Punjab

3.4.1.1. The proposed extension or strengthening of the existing embankments on the Yamuna will reduce the existing valley storage and may bring down a relatively bigger flood discharge, but this is likely to have an insignificant effect on the Ganga flows during floods.

3.4.1.2. The Punjab Government's proposals for construction of dams on the Tons, the Giri and the Yamuna, if found feasible on investigation, will solve the flood problem created by spill of the Yamuna.

3.4.1.3. For improving the drainage conditions of the tract, the capacity of the existing drains should be improved by removing obstructions, desilting the drains wherever necessary and increasing the waterway under the bridges and culverts where inadequate.

3.4.2. Delhi

The State Government's proposal to strengthen and to extend the existing Jainty bund lying in Delhi area, needs to be examined from economic and technical angles. Other villages and 'Abadies' outside the above bund, will need to be given local protection by providing ring bunds, raising their plinth levels, or shifting them to higher grounds. For the area upstream of Okhla Headworks the damage being not very significant only provision of local protection to villages and 'Abadies' is considered enough. The flood problem of Delhi area will be considerably solved if and when the dams proposed on the river Yamuna and/or its tributaries upstream of Tajewala are constructed.

3.4.3. Uttar Pradesh

3.4.3.1. The State has already carried out a number of schemes for improving the unsatisfactory condition of the drains in the basins of the Yamuna, the Ghagra, the Sarai and the Ganga etc., and has proposed more of such schemes for the future. These should prove quite beneficial.

3.4.3.2. The measure of shifting villages outside the flood courses of rivers is on the whole recommended. Opposition from people regarding shifting of villages to higher grounds has to be overcome by explaining to them the advantages of doing so. If, however, for any reason, it is not possible to do so, protection by raising their plinths or by means of ring bunds has to be provided. Such villages are likely to have drainage problem during monsoon and pumping arrangements may be necessary. It is necessary to mark flood courses of the various rivers and take legislative measures to prevent future encroachments.

3.4.3.3. In lieu of embankments the State authorities, like the Punjab, are now in favour of constructing reservoirs on the Yamuna and its major tributaries, investigations for which are in hand. As an immediate measure, however, local protection of villages by means of ring bunds, raising of their plinths or shifting them to high sites, etc., is suggested.

3.4.3.4. In view of the reduction in spilling over due to recent construction of a number of irrigation reservoirs on the tributaries of the Yamuna, the State Government propose to construct only short lengths of ~~embankments where~~ ^{embankments where} found necessary in the reach from the junction of the Betwa with the Yamuna down to Allahabad. The Committee agrees with this proposal.

3.4.3.5. The State Government's proposal to construct a storage dam in the upper catchment of the Ramganga to afford relief to about 50 per cent of the affected area down stream, is generally endorsed by the Committee.

3.4.3.6. In the case of the river Rapti, apart from the extension of the Maloni Bund, the State Government propose to construct 13 small storage reservoirs on its tributaries, a multipurpose storage reservoir on the main river at Jalakundi in Nepal. It is also proposed to raise some more villages and to improve the drainage system in the basin. In view of the heavy silt load carried by the river it is suggested that studies on the life of the proposed detention reservoirs and their economic justifications, together with soil conservation measures in upper catchment to reduce silt load, may be undertaken.

3.4.3.7. In the Sitapur and Kheri districts within the Sarva Basin, where the tributaries are unstable, it is not feasible to protect areas by marginal embankments. Investigations for carrying out soil conservation measures and locating some reservoir sites on the main river or its tributaries are therefore necessary. The Dhawar should be discouraged from developing into the main river. A scheme for it can be prepared only when the detailed surveys are completed.

3.4.3.8. In the case of the river Ghagra, the State Government do not propose to construct any flood detention reservoirs due to paucity of funds for carrying out surveys and likely protracted negotiations with the Nepal Government. It is, however, emphasised that for evolving long term solution for the flood problems surveys are necessary and funds for them must be found.

3.4.3.9.1. The Committee would like to stress the importance of undertaking soil conservation and land management schemes in the upper catchments of the Ghagra so as to form an integral part of an overall flood control plan to achieve enduring results.

3.4.3.9.2. The proposed embankments on the Ghagra to prevent its evulsion into the Kwano, should be examined in greater detail. The embankments will need to be tied into high ground at both ends.

3.4.3.10. The proposal of the State Government to construct an eight mile long Nepal bund on the Gandak seems to be necessary for saving a considerable area in Nepal as well as in India against flood hazard. Proposals for extension of the Chitauri bund need to be examined for its effects in Bihar.

3.4.3.11. As regards the flood problems on the minor rivers like the Sai, the Gomti, the Tons, the Ami etc., it is recommended that adequate widths of the flood courses be marked at site and if possible the land acquired. Where this is not possible, necessary legislation may be passed to prevent encroachments. It is recommended that various flood courses may be canalised. As far as possible, long lengths of embankments on these small streams should be avoided to prevent drainage congestion.

3 Bihar

3.4.4.1. It is proposed to embank the main tributaries of the Ghagra upto the point to which the back water extends. It is also necessary to provide some new embankments and to fill up gaps in the

existing embankments on the left bank of the Ghagra so as to have a continuous line from Uttar Pradesh - Bihar border down to Chapra town, as any upstream reservoirs will not have any appreciable result in the tail reach. The Committee agree with the above proposals. But as the railway authorities had previously objected to a continuous line of embankments, their concurrence has to be obtained.

3.4.4.2. The State Government's proposals for raising and strengthening of the two ring bunds and the right ~~embankment~~ on the Gandak in Saran district and embankments on the tributaries would help to reduce flood damage. Appropriate measures for the drainage of the country behind the embankments may, however, be kept in view.

3.4.4.3. The proposals for the extension of embankments, provision of extra waterway under bridges, channel improvements, flood diversions, and raising of marooned villages on the Burhi Gandak appear to be desirable and are recommended except for closing of the existing 16 miles gap, which needs further examination. There is no suitable reservoir site on the Burhi Gandak but there are a number of chauras in the basin. It is suggested that proper investigations be made to ascertain their capacity, and the possibility of using them as detention basins.

3.4.4.4. In the case of the Bagmati, the proposed short lengths of embankments on both banks above the Dhang Railway bridge No.89 may be undertaken to check its avulsion. The suggestions to increase waterway of bridges and to raise marooned villages appear to be reasonable. To check the spills in the lower reaches, the proposed embankment from Munighat to Hayaghat on the right bank also appears to be justified. It is proposed to connect the right embankment on the Bagmati beyond Karachin with the Nagarpara embankment on the Ghugri river. On the left side the Kamla, the Bagmati and the Kosi are also proposed to be embanked. These works are likely to have a serious effect on the already complicated drainage problem of the tract. A detailed study of the problems of this area and their solution will require collection of data, investigation and time, which the present Committee cannot afford. It is suggested that a whole time special Committee be set up for the purpose. Utilisation of chauras as detention reservoirs in the Bagmati basin is suggested to be further investigated by the State Government. Similarly the usefulness, feasibility and economics of the proposed dam at Ramchua may be investigated further.

3.4.4.5. The proposals to embank the Adhwara, the Marha, the Rato, the Sur Surindhar, the Dhaus and the Dharbhanga rivers may be considered only if the canalising already under execution on the Khirohi river proves successful. As the rivers of this network flow very near to each other, it is suggested that suitably placed sluices to permit controlled inundation of the areas may be provided in the embankments. The proposal for diverting some water into the old Kamla is considered desirable.

3.4.4.6. Details of the proposals for canalising the abandoned courses of the Kamla and the Lakhandeyi are not available. These should be carefully examined for economic justification of the proposals. The disposal of the Kamla waters in the lower reaches is linked up with that of the Bagmati and the Kosi. As such, it is recommended that this problem may also be looked into by the special Committee recommended earlier.

3.4.4.7. There is a proposal for a 67 mile long embankment from Buxar to Koilwar along the south bank of the Ganga. Before this embankment is taken up for construction, a careful study of the effect of flood control works already constructed or proposed higher up should be carried out.

3.4.5. West Bengal

3.4.5.1. On the Mahananda, the State has proposed a few town

protection schemes in addition to the ones already completed. They have also suggested some dams higher up to moderate floods and to generate hydro power. The above measures would be suitable, if found technically and economically feasible on further investigation. Along with all this, soil conservation measures and proper land management in the catchments are suggested. Any problem of emergent nature, arising in the meantime, will have to be solved on an ad-hoc basis wherever necessary. In the central areas of West Bengal, the main solution, would appear to lie in channel improvement of the Mahananda and its tributaries, though some embankments may also be necessary.

3.4.5.2. As regards the improvement of the Bhagirathi-Hooghly system, the State has proposed the following measures:

- i) Introducing sufficient quantity of controlled upland waters from the Ganga into the Bhagirathi by the construction of a barrage across the Ganga, above its off-take.
- ii) Controlling the silt of the principal tributaries of the river, particularly the Ajoy.
- iii) Training of the river and dredging of bars in the lower Hooghly.

3.4.5.3. The above proposals appear to be generally suitable. However, the proposals for dredging of the lower Hooghly and training works for improving the navigability of the river system require detailed examination by the State and Calcutta Port authorities. As the Bhagirathi-Hooghly is the main drainage outlet for practically the whole of West Bengal lying south of the Ganga, the drainage congestion in the area has, therefore, to be examined in detail and existing drainage channels improved and flushing arrangements provided wherever practicable. Undue interference by vested interests with natural flow of water in the drainage channels has to be prevented by having recourse to either the canals Act or the Bengal Embankment Act or by suitably amending the same to meet the situation. The necessity of retention or modification of the ex-zamindari embankments should be examined. Also, the adequacy of waterways provided in the railway, road and canal embankments should be checked up.

3.4.5.4. The State Government's proposals, not to construct any flood control works on the Jalangi, till the conditions in the outfall into the Bhagirathi are improved, are endorsed by the Committee.

3.4.5.5. The State Government has a proposal to investigate a cutoff on the Mayurakshi to obtain a steeper gradient. The idea is technically sound. It is suggested that the possibility of utilising some of the big depressions in the basin of the Mayurakshi-Dwarka system, as detention basins may be investigated. Investigations are also recommended to be taken up for possible storage dam sites on the Brahmani and the Dwarka.

3.4.5.6. On the Ajoy river, many old embankments have been taken over for improvement by the State Government. Some new embankments may also be required. Detailed investigations are, however, necessary to ensure that further embankments would not worsen the problem. In view of extensive damage caused by the Ajoy floods, the Committee feel that past investigations for a dam on the river, subsequently suspended, may be revived and completed as early as possible. A detention reservoir, if economically practicable, would mitigate the flood problem. The basic term remedy for reducing silt lies in soil conservation measures in the upper catchment, but the detention reservoir will also be helpful for the period of its life.

3.4.5.7. After the construction of the dams in the upper valley of the Damodar, the quantum of supply of upland water into the lower Damodar is likely to be reduced further, unless steps be taken to counteract the same. This question has already been examined by the lower Damodar Inquiry Committee set up by the Damodar Valley Corporation.

3.4.5.8. Soil conservation measures in the upper catchment of the Damodar basin which are already in hand, are expected to reduce the silt of the river,

thereby checking its tendency to change its course. As the lower Damodar is likely to deteriorate further, the recommendations made by the lower Damodar Inquiry Committee should receive careful and immediate consideration.

3.4.5.9. The proposed Kangsabati reservoir project is expected to moderate floods in the Kangsabati and to a certain extent in the Rupnarayan.

3.4.5.10. The flood problem of Sunderbans is created by premature reclamation and is therefore not dealt with here.

Review of available data and suggestions for the future

3.5.1. The Ganga basin, at present, has 1038 reporting, including 37 self-recording, and 800 non-reporting rain gauge stations. The average distribution of the reporting rain gauge stations comes to one rain gauge station for 384 sq. miles.

3.5.2. After installation of additional 460 rain gauge stations, of which 68 will be self-recording, during the Second Five Year Plan period, as proposed by the India Meteorological Department, the basin will have, including non-reporting stations, one rain gauge station for every 173 sq. miles of its catchment area. This is satisfactory when viewed for the entire basin. Some sub-basins like that of the Gandak and the Ghagra will, however, still have an intensity of 1 rain gauge station for every 503 and 354 sq. miles respectively. In such cases, more rain gauge stations will need to be established in the future Five Year Plans. The programme for setting up of these should be prepared by the Central Water and Power Commission in consultation with the India Meteorological Department. Care should, however, be taken that all essential areas are represented.

3.5.3. As the position of the self-recording rain gauge stations at the end of the Second Five Year Plan will still be inadequate, in view of major flood problems in the basin, an attempt should be made, in the first instance, to increase their number to 10% of the total rain gauge stations.

3.5.4. At present, there are, in all 225 gauge sites, 190 discharge sites and 73 silt sites in the basin. Out of these, 6 gauge and 21 discharge sites are maintained by various central agencies in the States of Uttar Pradesh and Madhya Pradesh.

3.5.5. The number of gauge, discharge and silt observation sites are inadequate in the various sub-basins. It is recommended that the programme for setting up additional gauge, discharge and silt stations should be framed by the State authorities in consultation with the Central Water and Power Commission or other Central Agency dealing with the subject.

3.5.6. Up to the end of December, 1957, the Survey of India has prepared 2" semi-controlled photomosaics for an area of 12,099 sq. miles in Uttar Pradesh, 13,184 sq. miles in Bihar and 2,093 sq. miles in West Bengal. In addition, 4" photomosaics with spot heights have been prepared for some areas in Uttar Pradesh, Bihar and West Bengal.

3.5.7. The States of Bihar and West Bengal have also carried out surveys, consisting of longitudinal and cross sections of some of the flood affected rivers under their respective jurisdictions.

3.5.8. The Survey of India have almost completed the work required of them in this region. However, it would be desirable to repeat aerial photography of the unstable rivers like the Kosi, and the Kamla etc., every 5 years and for other rivers every 10 years, to show changes that may take place in river courses.

3.6. Acute flood problems and lines for their solution

Except for the state of Uttar Pradesh, no other State within this basin has posed any acute flood problem to the Committee. The flood problems of the Ghagra and the Rapti in Uttar Pradesh have been dealt with in Chapter IV.

NORTH WESTERN RIVERS BASIN

Main features

4.1.1. The region pertaining to the North Western rivers covers the State of Jammu & Kashmir, major parts of the Punjab, and the Himachal Pradesh and a part of Rajasthan. It comprises parts of the Indus river and its five tributaries.

4.1.2. The region experiences monsoon as well as winter rains. The normal annual rainfall in the Jammu & Kashmir, the Punjab hills and the Punjab plains is 39, 71 & 26 inches respectively. More than 80% of the rainfall in the Punjab and about 50% in Jammu & Kashmir occurs during the monsoon season.

The flood problem

4.2.1. In Kashmir valley, the flood problem is mainly caused by inadequate capacity of the river Jhelum particularly below the Wular lake to carry its discharge during major floods. This causes breaches in the embankments along the river and flooding of large tracts of cultivated areas, as also damage to property both public and private. The second aspect of the problem relates to the Wular lake in which flood waters accumulate raising its level and overtopping its reclamation bunds.

4.2.2. The problems on the major rivers of Jammu province, namely, the Chenab, the Jammu Tawi and the Western Tawi are spilling and heavy bank erosion.

4.2.3. The nature of flood problem in the Punjab is, by and large, that of inadequate land drainage affecting an area of about 3000 sq. miles. The other problem is in respect of "choes", which overflow their banks during floods, submerge large areas and render them unfit for cultivation by covering them with coarse silt. They cause more damage than the major rivers in the State. The third problem is spilling of the major rivers like the Ravi, the Sutlej and the Beas.

Review of the measures undertaken so far Jammu and Kashmir

4.3.1. In the distant past, the whole of the 72 miles of the Jhelum from Sangam to Banyari was embanked on both sides except for high spots; and above Sangam, in scattered reaches. Some of the tributaries were also embanked in their lower reaches. All these embankments were, however, of insufficient section. In 1904, a flood spill channel for a discharge of 17,500 cusecs was constructed to bypass the Srinagar town.

4.3.2. Main recommendations of the following Experts on the flood problem are described.

- (i) Mr. R.E. Purves.
- (ii) Shri Tulsi Dass.
- (iii) Shri D.G. Harris.
- (iv) Dr. H.L. Uppal.
- (v) Central Water & Power Commission.

4.3.3. Since 1954, the State has undertaken the work of enlarging and excavating the spill channel and constructing marginal bunds at a few places.

The Punjab

4.3.4. Some marginal embankments, in scattered reaches were constructed on the Ravi and the Beas. The Bhakra Nangal Multipurpose project, which is still under construction, will have an appreciable effect on moderating the flood peaks of the Sutlej river.

4.3.5. No flood Committees or Experts were appointed to investigate flood problems of the Punjab in the past.

4.3.6. The works taken up since 1954, consist of a few miles of local embankments along the Ravi, and the Ghaggar, and canalising of some nallas in Amritsar and Hoshiarpur districts.

Lines suggested for future measures

Kashmir Valley.

4.4.1. In June, 1958, the proposals made by the Chief Engineer, Jammu and Kashmir in the Outline Plan for Jhelum river, were discussed with him by the Committee Members. Some modifications in these proposals were suggested. The Chief Engineer is still preparing the final proposals. The general lines of the suggested approach have been briefly discussed in Part IV of this volume.

Jammu Province

4.4.2. For the Jammu Province, the State Engineers are still collecting data and are carrying out investigations. Suggestion for flood control can be offered after these investigations are complete.

The Punjab

4.4.3. The State's proposals with regard to drainage schemes contained in their outline plan should be examined by the Central Water and Power Commission, keeping in view the overall plan for each drainage basin.

4.4.4. The local embankments already constructed on the Ravi, the Beas, together with the Bhakra Dam, when completed, will reduce the problem of spilling.

4.4.5. The waterways of minor rivers like the Ghaggar and its tributaries need to be improved and resuscitated. The waterways provided at their crossings with the railway and canal alignments also need to be examined and increased wherever necessary.

Review of available data and suggestions for the future

4.5.1. This region, at present, has 207 reporting (including 3 self-recording) and 203 non-reporting rain gauge stations. The average distribution of rain gauge stations, works out to 1 rain gauge for every 292 sq. miles, while excluding non-reporting stations it comes to 1 rain gauge for every 576 sq. miles.

4.5.2. After installation of additional 75 ordinary rain gauge

stations and 13 self-recording raingauge stations in this region during the second Five Year Plan period, as proposed by the Indian Meteorological Department, the distribution will be 1 raingauge station for every 240 sq. miles. Considering the available resources, this is considered adequate for the present. A programme for more stations in future plans should be prepared by the Central Water and Power Commission in consultation with the Indian Meteorological Department. More self-recording raingauges will also need to be set up, aiming at a target of 10 per cent of the total number of raingauge stations.

4.5.3. At present there are, in all, 90 gauge sites, 84 discharge sites and 27 silt sites on the Indus river and its tributaries. In Jammu & Kashmir there are 82 gauge sites and 57 discharge sites. There are no silt sites in the State. In the Punjab and Himachal Pradesh there are 8 gauge sites, 27 discharge sites and 27 silt sites on the various rivers. This number is inadequate. The programme for additional gauge and discharge sites should be framed by the State authorities in consultation with the Central Water and Power Commission. As regards silt sites, the aim should be to have silt observations made at every discharge site. Such an expansion programme will necessarily have to be spread over a number of years, according to the availability of resources.

Acute problems and lines for their solution

The Punjab

4.6.1. A large number of "choes" cause heavy damage in Hoshiarpur district by deposition of coarse sediment over large areas, and thus render them barren. The "choes" are very unstable and any effort to canalise them cannot be successful unless very expensive training works are carried out. The fundamental remedy would be to reduce the silt in the "choes" by adopting suitable soil conservation measures in their catchment areas. In the lower flood plains, local problems can be dealt with individually, depending upon the nature and the magnitude of the problem.

4.6.2. The Sutlej causes flooding in the Giddarpindi area due to the afflux created by inadequate waterway at the Giddarpindi Railway bridge as also at the Harike Barrage. The State is considering the proposals of increasing the waterway of the Railway bridge by 200 feet and of adding additional bays to the barrage. The State, the Railway authorities and the Central Water and Power Commission should carry out joint detailed hydrological studies to determine the additional waterway required at the railway bridge. As regards the afflux at Harike barrage, the flood moderating effect of Bhakra dam and any other works on these rivers which may affect the flood flows should be considered and the economics of increasing the waterway of the barrage worked out.

CENTRAL INDIA RIVERS BASIN

Main features

5.1.1. The region pertaining to the Central India Rivers covers the States of Orissa, Bombay, Andhra Pradesh, Mysore, Madras, Kerala and portions of Madhya Pradesh and Rajasthan. The Peninsula, a major portion of which is constituted by the Deccan plateau, is very old and has been geologically inactive for ages.

5.1.2. The rivers of this region are of great antiquity and have well defined stable courses. Except for the Sabarmati, the Narbada and the Tapti, which flow west, all the major rivers of the region flow eastwards. The west flowing rivers lack deltaic deposits at their mouths, whereas the larger of the eastern flowing rivers have considerable deltaic deposits.

5.1.3. The Peninsular region receives rainfall mainly during the south-west monsoon season, though the coastal areas of Madras and Andhra receive rainfall during the north-eastern monsoon season also. The annual rainfall in the western ghats is over 100" along the coast and the lower slopes of the hills, whereas, in some places in the higher slopes of the Coorg, it is over 200". The central areas of the Peninsula get low rainfall and consequently the area is semi-arid. Along the eastern ghats, the annual rainfall is only 30" to 50".

5.1.4. The more important east flowing rivers are the Subarnarekha, the Baitarani, the Brahmani, the Mahanadi, the Vamsadhara, the Godavari, the Budameru, the Krishna, the Pennar, the Palar, the Ponnaiyar and the Kaveri. The more important of the west flowing rivers are the Tapti, the Narbada and the Sabarmati.

The flood problem

5.2.1. The rivers of this region are rain fed unlike the Himalayan rivers which are snow fed and perennial. Therefore, the disparity in the maximum and the minimum flows in these rivers is very marked. They further differ in respect of topography, orography, geological formations and rainfall intensities. The former, have comparatively less sediment load, and in consequence are more stable. With heavy downpour of rain in their catchments, the Peninsular rivers spill over their banks in the lower reaches, causing flooding particularly in the delta areas.

5.2.2. The formation of sand bars at the mouth of the east flowing rivers due to littoral drift along the east coast, chokes the river mouths, thereby aggravating their flood problems. Also, sand blowing landwards from the sea coast piles up in the shape of long sandy ridges thus obstructing land drainage in the coastal areas.

5.2.3. The main flood problems of Orissa State are:-

- i) Congestion at the mouths of the rivers due to the backing up effect of high tides, which results in higher flood levels and consequent spilling;
- ii) Formation of sand bars across the mouths of the rivers from south-west to north-east due to littoral drift;
- iii) Flooding due to intermixing of water of various rivers in the delta areas whenever there is heavy rainfall simultaneously in the catchment areas of more than one river; and

- iv) Obstruction of drainage due to private embankments constructed by cultivators especially along the sea coast in order to prevent the saline water of the sea from flooding their lands.

In addition to the common problems mentioned above, flood problems riverwise are as under:-

- i) On the Mahanadi, lack of control, in the deltaic area, on the distribution of flood waters among the various distributary channels in proportion to their carrying capacity.
- ii) Occurrence of breaches in the flood embankments of the Brahmani and the Baitarani during high floods.

5.2.4. In Andhra Pradesh, by and large, rivers have stable courses and good regime. The Godavari which is embanked in the lower reach below Polavaram sometimes breaches its embankments during floods, causing enormous damage. In the case of the Krishna, due to extension of its delta by 2 miles over a sea face of 14 miles into the sea, the bed of the river in its lower reaches has risen, with consequent rise in flood water levels. The Ponnar gets only flashy floods.

5.2.4.1. The coastal streams present a fairly big flood problem in the lower reaches on account of inadequate carrying capacity.

5.2.4.2. The existing irrigation and water supply tanks in the State, create a serious flood problem when any one of them breaches.

5.2.5. The remaining states of the region have no serious flood problem except occasional local flooding due to storms of high intensity.

Review of measures undertaken in the past

5.3.1. Orissa

5.3.1.1. Past flood control measures were confined only to sporadic construction of private embankments with inadequate sections, built more than a century ago. These were indifferently maintained and as such, afforded poor protection where protection was needed most. The Public Works Department took over the maintenance and improvement of most of these embankments between 1831-1855. The flood problem, however, remained unsolved.

5.3.1.2. Several Committees and Conferences have reported on the flood problems in the State. The more important ones are:-

- (i) Report by R.H. Rhind, 1872.
- (ii) Report of the Orissa Flood Committee, 1928.
- (iii) Preliminary Note on the Flood Problem in Orissa by M.Visvesvaraya, 1937.
- (iv) Report of the Orissa Flood Advisory Committee, 1938-42.
- (v) Second Note on the Flood Problem in Orissa by M.Visvesvaraya, 1939.
- (vi) Proceedings of Provincial Flood Conferences, 1945-49.

5.3.1.3. Recently a multipurpose dam affording appreciable flood moderation has been built on the Mahanadi at Hirakud. In addition, flood control works comprising mostly strengthening and raising of existing embankments on the various rivers in the Orissa delta have been taken up together with raising of

marooned villages in low areas.

Andhra Pradesh

5.3.2.1. Past flood control measures were primarily confined to construction of embankments on some of the more important rivers, such as the Godavari, the Krishna and the Pennar.

5.3.2.2. No reports of any Committees formed in the State prior to 1953 to deal with the flood problems were made available. Special Chief Engineer, Andhra State, prepared a comprehensive report on the 1953 floods in the Godavari. Since then some other Committees have dealt with specific flood problems on this river.

5.3.2.3. Since 1954, the State has not taken up any major flood control works except the diversion of half the flood discharge of the Budameru into the Krishna, and the construction of a 15 mile long embankment on the Krishna above Vijayawada anicut.

5.3.2.4. In other States of this region, there has been no serious flood problem and in consequence, no large scale flood control measures exist.

Lines suggested for future measures

Orissa

5.4.1.1. A study of the previous and recent Survey of India maps have shown that the delta of the Orissa rivers has not extended significantly during the last century. Therefore, construction of embankments for preventing flooding of lands by river spills would be a suitable remedy subject to the provision of suitable drainage sluices.

5.4.1.2. Formation of bars due to littoral drift along the sea coast, is a natural phenomenon and cannot be checked. The mouths of the rivers can, however, be kept open by dredging. In other cases, cuts at suitable places in the sand bars will be necessary.

5.4.1.3. In the case of interlinked rivers distribution works need to be constructed at some of the bifurcation points to ensure proper distribution of flood waters.

5.4.1.4. A solution of water logging in low lands behind private embankments or sand dunes along the coast, lies in improving the drainage by providing non-return sluices in the former or by making cuts in the latter, where feasible. Where the above is not practicable, pumping would be the only alternative subject to its economic justification.

5.4.1.5. The flood warning and forecasting system above the Hirakud dam should be expanded and improved. Along with this, there should be arrangements for receiving similar information from the uncontrolled catchment lower down. The Hirakud dam if judiciously operated, on receipt of flood warning and forecasting from above and below, can be very effective in reducing flood peaks and their duration. The various distributary channels of the Mahanadi below Cuttack are uncontrolled and in consequence some of them experience heavy floods even with a safe gauge at Naraj. It is therefore, necessary to provide regulation works for the Katjuri, the Birupa and some other important channels. In addition, closing gaps in the embankment and strengthening and raising them is necessary. After execution of the above proposals, much of the flood problem on the Mahanadi is expected to be solved. The Tikerpara dam, when constructed for irrigation and hydro-electric power, will take care of any residual flood problem.

Mahanadi

5.4.1.6. The proposed irrigation weir across the Mahanadi at Mundali above Kathjuri off-take does not help flood control, and should be replaced by two barrages, one across the Kathjuri and the other on the Mahanadi at Naraj to ensure irrigation as well as flood control. If a weir is built now at Mundali, it is most unlikely that another big structure will be built a couple of miles lower down in the interests of flood control, which in consequence will continue to suffer.

5.4.1.7. The proposed storage dam on the Brahmani at Rangali, if built for adequate capacity, should moderate floods to a safe limit downstream. Optimum distribution of flood waters below Jenapur will also considerably mitigate the problem. Schemes for this, however, need to be examined. The existing embankments in the delta portion need to be brought to a uniform standard.

5.4.1.8. The proposal to construct a multipurpose reservoir on the Baitarni at Bhinkund, together with some embankments in the lower reaches for flood control, is generally on the right lines, but the extent of anticipated benefits will depend on the capacity of the reservoir and the size of the catchment area intercepted by it.

5.4.2. Andhra Pradesh

5.4.2.1. Storage reservoirs at Ippur, Itchampalli, Pochampadu etc., in the Godavari basin are contemplated by the State Government. If these dams are built on a multipurpose basis, they would be most useful in moderating floods. If the above proposals do not materialise, the existing embankments in the delta area will need to be strengthened.

5.4.2.2. The old existing embankments on the Krishna have, by and large, successfully prevented serious flooding in the area. The Tungabhadra dam recently built is already having some moderating effect on floods in this river. Nagarjunasagar dam, on completion, will also lead to substantial moderation of floods. Due to the anticipated reduction in the upland discharge which will be caused by the Nagarjunasagar dam, some choking of the mouths of the river distributaries by the silt brought in by tides, is to be expected. If this becomes a serious problem, the remedy will lie in either dredging, or flushing with special water releases from the dam. Annual observations of river bed levels in these reaches is advised.

5.4.2.3. The economics of the proposal of a storage dam across the Pennar river at Somasila purely for flood control needs to be examined as such a dam is not ordinarily justified. The existing embankments, which breach off and on, need to be strengthened.

5.4.2.4. For solving the flood problem on the coastal rivers, the State Government have proposed construction of storage dams in the upper reaches and embankments in the lower reaches. The storage reservoirs would help in moderating floods, but it is felt that these, if constructed only for flood control may not be economically justified. These may, therefore, also cater for irrigation and hydro-electric power. Embankments in the lower reaches would be useful.

5.4.2.5. To prevent disasters caused by breaches in irrigation tanks, it would be necessary to prepare a comprehensive scheme for strengthening and maintaining the banks in the State. To start with, it may be possible to strengthen the banks of every 5th or 6th tank. Even this work will require a large amount of money and it will be necessary to spread it over several years.

5.4.2.6. There are no serious flood problems in other States like Madhya Pradesh, Madras, Mysore and Kerala. Bombay has some small problems requiring minor schemes of a local nature.

Review of available data and suggestions for the future.

5.5.1. The Central India Rivers basin, at present, has

2156 reporting, including 34 self-recording, and 502 non-reporting rain gauge stations. The average distribution per rain gauge station for different river basins in the region varies from 127 to 657 sq. miles.

5.5.2. The India Meteorological Department proposed to instal 749 rain gauge stations including 76 self-recording, in the various basins during the Second Five Year Plan period. This region, will then have, one rain gauge station (including non-reporting ones) for areas varying from 124 sq. miles to 214 sq. miles. This is satisfactory. Care should, however, be taken that all essential areas are suitably represented.

5.5.3. The total number of self-recording rain gauge stations at the end of the Second Five Year Plan will be 110. This is considered inadequate. The number should be about 10% of the total number of rain gauges.

5.5.4. At present, there are, in all, 310 gauge sites, 278 discharge sites and 164 silt sites in the various basins. These are considered inadequate. The number should be suitably increased by the State authorities in consultation with the Central Water and Power Commission. Very few of the silt sites proposed by the Central Water and Power Commission have been set up. It is recommended that the balance may be set up as early as possible.

5.5.5. In Orissa, upto the end of December, 1957, semi-controlled photo-mosaics to a scale of 2" to a mile were completed by the Survey of India for an area of 994 sq. miles. Photo-mosaics to a scale of 4" to a mile showing spot heights have also been prepared for some areas. While this is satisfactory, it is considered that some more surveys are necessary for solving the flood problem of the Subarnarekha. Also the area pertaining to the Kolleru lake problem should be surveyed. In other States there are no serious flood problems requiring such surveys.

Acute flood problems and lines for their solution.

5.6.1. The States of Orissa and Andhra Pradesh have referred to the Committee acute flood problem of the Subarnarekha river and the Kolleru lake rivers respectively.

5.6.2. Orissa

5.6.2.1. The basic flood problem of the Subarnarekha river is wide spread inundation due to inadequate channel capacity. The problem is further aggravated by inefficient land drainage of the surrounding country, defective alignment of the existing Bhograi and Joki embankments, and premature chak-bundi in the shore land, as also by tides.

5.6.2.2. The work of improving the drainage of the Chittai and Kaljori nallas and providing a direct cut for the Subarnarekha at Amchua are in progress. These are in the right direction.

5.6.2.3. The basic solution of the problem would be the construction of storage reservoirs in the upper reaches or flood embankments in the lower delta reach. Both of these are not considered feasible by the State Government. The only alternative would, therefore, be to evolve ways and means of getting rid of the flood waters expeditiously.

5.6.2.4. The Committee do not recommend removal of the Joki embankment, as this would only transfer the problem to areas in West Bengal. Similarly the State proposal for constructing a new flood embankment joining the Bhograi and Joki embankment is not considered suitable. The Committee also do not recommend construction of a sluice in the right bank of the coastal canal near its outfall for drainage of the flood waters during the post-flood period. The Committee agree with the 1928 Orissa Flood Committee's views that the proposed improvements to the alignment of the Bhograi embankment should not be undertaken.

5.6.2.5. The following measures are recommended in addition to those already in hand.

- i) The coastal area of the Subarnarekha should be surveyed to locate the drainage lines. These should be resuscitated and cross drainage works provided across the canal.
- ii) Important villages subject to flooding be suitably raised or provided with ring bunds.
- iii) Provision for additional bridges under the road and railway lines or increasing the waterway of the existing bridges and culverts be made.
- iv) The depth of submergence in the area between Subarnarekha and the road above Jaleswar railway station be reduced by increasing the waterway of the existing road and railway bridges. The proposed bund would not then be necessary.
- v) The low pockets should be drained into the Chittai nalla or directly into the Subarnarekha.
- vi) The low pockets between the coastal canal and the Joki embankments should be drained into the coastal canal by non-return sluices.
- vii) The Agriculture Department should suggest suitable crops which can stand prolonged flooding.

5.6.3. Andhra Pradesh

5.6.3.1. The Kolleru lake has a catchment area of 2120 sq. miles. The combined discharge of the various channels flowing into this lake has been calculated to be of the order 1,24,000 cusecs. The lake has only one outlet, the Upputeru, which flows into the sea. Its maximum discharging capacity is 10,870 cusecs only. Consequently, during monsoon season the lake level rises and submerges large marginal lands. In addition, there is inundation on the inflowing channels due to backing up of water for Kolleru lake.

5.6.3.2. A number of reservoir, diversion and embankment schemes on various rivers, costing Rs.646 lakhs have been proposed by the State Government. Out of these, diversion of part discharge of the Budameru into the Krishna, and the dam across the Pullivagu are in progress.

5.6.3.3. The Committee feel that construction of dam on the inflowing streams purely for purposes of flood control is not likely to be found economically feasible. The proposed embankments in the lower reaches of the inflowing streams will prevent flooding around the Kolleru lake. On account of its flat slope, the proposal for increasing the discharging capacity of the Upputeru has its limitations.

/along those streams but will increase flooding

5.6.3.4. In the present situation, a partial remedy would lie in decreasing the inflow into the Kolleru and increasing the discharging capacity of the Upputeru to the extent it is feasible. If the lake level could be lowered by about 2 ft. during the monsoon, a large part of the affected area will be available for cultivation in most of the years. The State authorities have worked out that with the present diversion scheme of the Budameru the lake level would be lowered by about a foot.

5.6.3.5. The Committee suggest that the capacity of the Budameru diversion be increased as much as is economically feasible.

5.6.3.6. The proposed reservoir on the Thammileru would be economical, only if considered on multipurpose basis.

5.6.3.7. It is suggested that detailed investigation should be carried out for improving the drainage capacity of the Upputeru by providing independent drainage lines on both sides of the Upputeru, removing obstructions in its bed, providing cuts for straightening its course, widening it to its optimum section/ providing a direct cut into the sea from above the confluence of the Yarrakalva with the Upputeru etc.

5.6.3.8. It is expected that the above improvements in the Upputeru combined with the increase in the capacity of the Budameru diversion or alternatively with the construction of the multipurpose dam on the Thammileru would lower the water level in the Kolleru lake by about a foot. After carrying out these schemes, it will be useful to construct low embankments around the lake to reclaim marginal land. The area outside these embankments could be drained through non-return sluice valves in the embankments or by providing pumping arrangements.

RIVER BASIN IN MANIPUR, TRIPURA AND RAJASTHAN STATES

6.1. Manipur

6.1.1. The main valley in this Union Territory of Manipur is 30 miles by 20 miles at an elevation of 2,500 ft. and is surrounded by hills on all sides. The notable feature of the valley is Logtak lake covering an area of about 36 sq. miles in dry weather and approximately double this size in the monsoon. The soil of the valley is alluvial clay washed down from the hills and therefore very fertile. Manipur is subject to seismic disturbances. The annual rainfall varies between 30" to 100", almost half of which occurs during June to August. The principal rivers are the Imphal, the Iril, the Thoubal and the Nambul. They are all rainfed.

6.1.2. Review of measures undertaken so far

6.1.2. The existing embankments maintained by Government, total about 95 miles. In addition, there are other small and sub-standard embankments. The State proposes to improve 227 miles of embankments during the Second Five Year Plan, provided funds are made available.

6.1.3. The flood problems and lines suggested for their solution.

6.1.3.1. The flood problems of this State are twofold:

(i) Overtopping and breaching of existing embankments from time to time due to inadequate capacity of the rivers.

(ii) Submergence of marginal lands of Logtak lake, Lusipat lake etc.

6.1.3.2. As regards the first problem, the obvious solution is strengthening of the embankments by increasing their section and providing adequate free board. Regarding the latter, some reclamation of marginal lands might be possible by building ring bunds around the lakes and running them up along the inflowing streams. The feasibility of this idea can be judged, when detailed contour maps become available. The observation of gauges at salient points of the lake should be continued.

6.1.4. Review of available data and suggestions for the future.

6.1.4.1. Up to end of November, 1957, there were 9 reporting rain gauge stations including 1 self-recording. Nine additional rain gauge stations are proposed to be set up in the Second Five Year Plan. Even with the installation of these, the overall position will be unsatisfactory, except for the Imphal basin. Additional rain gauges will, therefore, be required to be set up in other basins, as resources become available.

6.1.4.2. There are 25 gauge sites, 15 discharge sites and 3 silt observation sites in the State. The number is generally adequate except for silt observation sites, which should be increased in consultation with the Central Water & Power Commission.

Tripura

6.2.1. Tripura is a level alluvial plain mostly cultivated, except for isolated hills. It has rivers flowing in all directions. The principal rivers are the Haora, the Khowai, the Gumti and the Manu, all being rainfed. Some of these are navigable throughout the year. This territory is also subject to seismic disturbances. The annual rainfall averages 76", most of which occurs from May to September, with the maximum in June.

Review of measures undertaken so far

6.2.2. Prior to 1954, a total length of 19 miles of embankments existed. Since 1954, some town protection works and a ring bund around Agartala have been completed.

The flood problems and lines suggested for their solution

6.2.3.1. The main flood problems are:-

(i) Breaching and overtopping of the existing embankments.

(ii) Bank erosion by the Gumti.

6.2.3.2. The scope for moderating floods on these rivers is extremely limited, as there are practically no storage or detention basin sites available there. The following lines are, therefore, suggested for mitigating the flood problems:

(i) For the protection of important towns, ring bunds with adequate free board should be constructed. Suitable one-way sluices and pumps where necessary should be installed for drainage purposes.

(ii) Where damage is mainly caused by spills, embankments should be provided.

(iii) Local protection and/or training works should be constructed where damage is caused by bank erosion.

Review of available data and suggestions for future

6.2.4.1. Up to the end of November 1957, 9 reporting rain gauge stations existed, of which 1 was self-recording. With the installation of 3 additional stations proposed during the Second Five Year Plan, the overall position will be reasonably satisfactory.

6.2.4.2. At present, there is 1 gauge site, 8 discharge sites, and 5 silt observation sites. The number is generally adequate for the present, for purposes of flood control.

6.3. Rajasthan

6.3.1. The Aravalli range runs through the centre of Rajasthan.

North West of this range, the country is very dry and slopes down gradually towards the Indus valley and the Punjab plains. This sloping area forms the Thar Parkar desert. The average annual rainfall varies from 8" in the north to about 50" in the south east. The State is traversed by 2 principal drainage systems, the Luni and the Chambal. These rivers carry large discharges during the monsoon and are almost dry for the rest of the year. They have well defined channels and flow mostly within banks.

The flood problems and lines suggested for its solution

6.3.2.1. There is no flood problem in the State, except in Bharatpur area, over about 1400 sq.miles. The floods are not frequent, although their frequency seems to have increased during the last few years. There are a large number of detention basins which get overtopped or outflanked resulting in flooding lower down. It is necessary to collect all the hydrological data, which are at present conspicuous by their absence. Flood control cum irrigation schemes may then be prepared for Bharatpur area.

Review of available data and suggestions for the future

6.3.3.1. In the Luni basin and Thar Parkar desert areas, there are 56 reporting rain gauge stations of which 2 are self-recording; and 29 non-reporting rain gauge stations. The position at the end of the Second Five Year Plan with the installation of additional 35 stations, will be satisfactory.

6.3.3.2. The existing 6 gauge sites in the Luni basin should suffice for the present. There are no silt observation sites in the State, nor is there a pressing need for any.

X

UNESCO SOUTH ASIA SCIENCE CO-OPERATION OFFICE

Proposed Institute for Arid Zone Research in India

Skeleton notes for discussion at a meeting on
Friday, the 12th December 1958

The name " Central Arid Zone Research Institute " is proposed. The proposal has been variously referred to as a Desert Research Institute and a Central Arid Zone Research Station. It is suggested that a Central Institute with sub-stations is required and that the term arid zone is preferable to desert, as India appears to have very little true desert.

Further, an Arid Zone Research Institute will have greater international significance than a Desert Institute.

Scope

To study the basic problems of practical importance both to the land and the people of the arid and semi-arid zones.

Methods

The Institute's programme should be based on a fundamental approach to these problems by which is meant the type of research conducted should attempt to explain the basic reasons for the result obtained and to give quantitative results. It should aim at establishing principles of wide application. The Institute should not be merely a regional station dealing with local problems and their temporary solution.

The defined problems should be approached by any scientific discipline that is appropriate including academic studies where these are essential for the elucidation of the major problems.

Research Programme

The Institute should adopt a research programme consisting of major projects related to the basic problems of the regions. In defining and planning these projects all appropriate

research groups in and outside the Institute should be consulted. The implementation of these plans within the Institute should be through project groups composed of research staff allocated from the specialist divisions and sections and led by an officer selected by the Director. Thus the emphasis will be on integrated research by groups of specialists, although certain aspects of projects may include activities confined to one specialist group.

The report will outline the major projects which can be defined at this stage.

Liaison

By close liaison the Institute should seek assistance and advice from other laboratories and organizations conducting basic research in specialized fields which would not be appropriate for the institute to develop in a comprehensive way. The practice of the secondment of officers from such organizations to work in the Institute on special short-term aspects of projects should be developed.

Continuity of Approach

Whatever organization and approach to the study of the problems of these regions is adopted, it is highly important that a consistent approach be maintained.

Status

There has been some implication that the Institute should be an expansion of the existing Desert Afforestation and Soil Conservation Station at Jodhpur. It is suggested it would be wiser to conceive the Institute as an organization with an appropriate staff established to cover the problems involved and that the present station might be absorbed by this Institute rather than have it slowly develop as an expansion of the present station.

It is recommended that the Institute should have a status equivalent to such organizations as FRI, IARI etc.

External Administration

It is recommended that the Institute should be so placed in government administration that once the budget has been

determined the Institute is virtually autonomous, subject only to the approved policies of a governing council. The Director of the Institute should be selected for his ability to develop the research programme indicated and he should be given the responsibility and freedom to exploit his own initiative and likewise should encourage the development and expansion of initiative by his research staff. The Institute should be as free as possible from time consuming departmental routines of administration.

Location

Jodhpur has been specifically mentioned as a possible location although a number of other sites have been considered. The Institute will be concerned with arid areas of very low rainfall 5 - 10 inches, intermediate areas of 10 - 15 inches and semi-arid areas of 15 - 30 inches of rainfall per annum. Insofar as Jodhpur occurs in the intermediate range and is reasonably accessible to the others, it is a satisfactory geographical location for the Institute. However, before Jodhpur can be considered as a satisfactory site, three things are necessary :

1. Buildings with adequate accommodation for the various laboratories and offices appropriate to a Central Institute;
2. Staff is unlikely to be attracted by present housing conditions in Jodhpur. Therefore satisfactory provision must be made for domestic accommodation.
3. An expansion of the existing area of land which has been allotted to the Desert Afforestation and Soil Conservation Station to provide adequate areas for institute buildings, domestic accommodation and short and long term field experiments.

As emphasized previously the restrictions of the present concept of this station should not be allowed to interfere with the concept of the Institute.

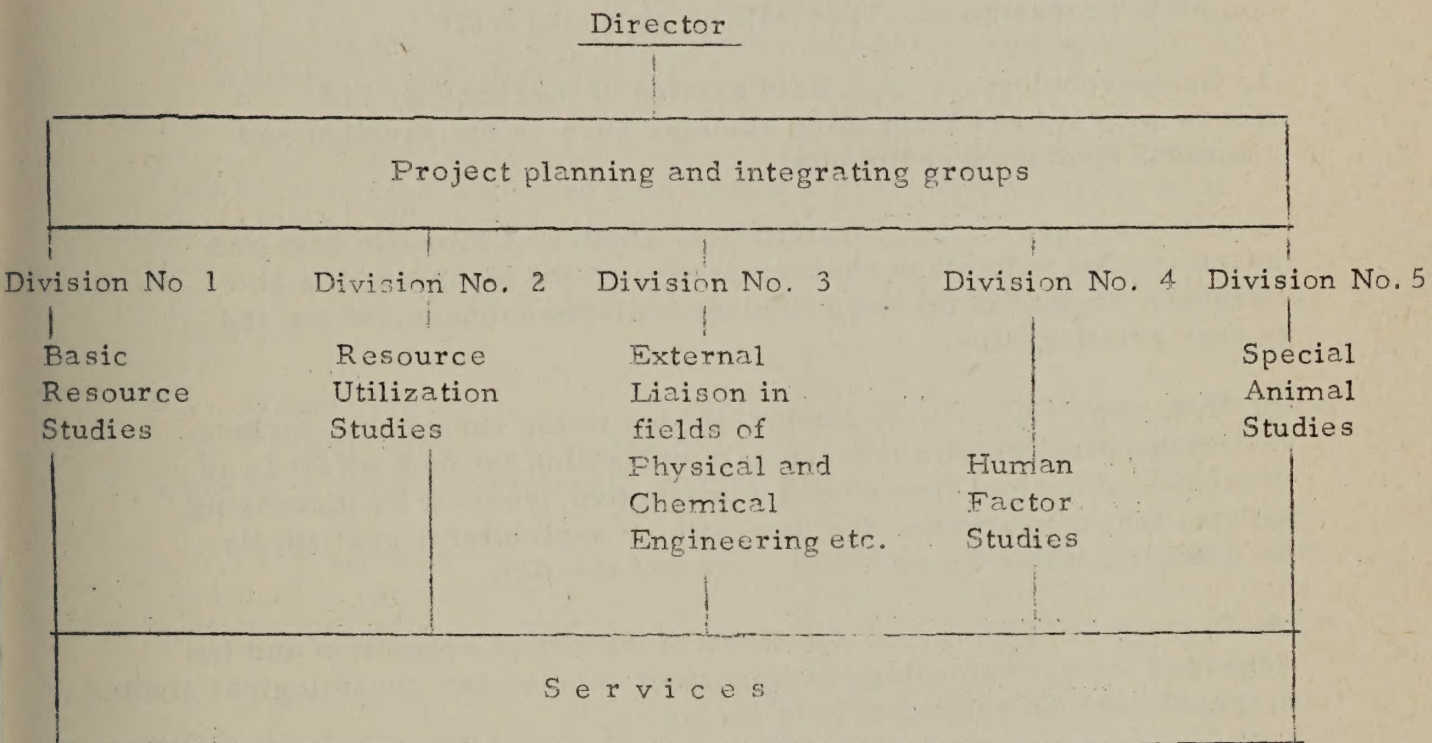
Stage Development

It is recommended that the Institute should be conceived and approved as a whole. However, it would not be practicable to establish the whole institute at the beginning

and for this reason a stage by stage development of the institute and of its divisions is proposed. The first stage coincides with the remainder of the Second Five Year Plan and the second with the Third Five Year Plan.

PROPOSED ORGANIZATION

The general organization of a Central Research Institute with a small number of branch stations in selected variants of the arid and semi arid environments is recommended. These branch stations which would individually emphasize particular aspects of the investigations should be chosen after the preliminary basic resource studies referred to in the programme have been conducted.



Organization of the Institute

DIVISION NO. 1

Basic Resource Studies

This division will provide the essential scientific facts which will enable the broad problems to be analysed into their specific technical problems and thus will provide the basis for the

individual research projects.

It will first make a comprehensive " land survey " [land is used in the sense of the Australian CSIRO resource surveys] which will indicate the major sub-divisions of the regions requiring individual study and presenting characteristic problems. This first survey will assist the general orientation of research in the other Divisions ensuring proper emphasis. It will be followed by a continuing study of specific factors of the environment in the technical fields listed below. Against each are given examples of the type of work involved. These should not be considered as complete programmes. They will be expanded later :

1. Geomorphology.....field studies of morphology and morphogenesis and laboratory studies, such as the physical and chemical studies of sediments.
2. Climatology.....statistical studies of climatic data and relationships with other characteristics of the environments and research studies in the field of plant-soil-atmosphere, water and energy relationships.
3. Hydrologyunder-ground water resources; surface hydrology with specific reference to utilization by such methods as diversion of normal flow to more productive areas or by increasing infiltration; conservation for domestic or agricultural use; supply of domestic water by such means as desalination.
4. Ecology.....ecology of the native vegetation and its degraded forms; autecology of important species and physiological studies of a specific nature related to arid problems.
5. Pedology.....soil studies as part of the comprehensive land survey and subsequently laboratory studies into physical and chemical aspects of soils, soil fertility and erodibility studies.
6. Agricultural chemistry.... soil plant and water chemistry, initially mainly analytical.

At a later stage of development of the Institute, biochemical studies will almost certainly require the development of a specialized group . Likewise the need to develop mycology and indeed other fields may emerge from the results of investigation.

The zoological studies which will be necessary for a thorough understanding of arid zone environments will be conducted by the Animal Division in collaboration with the Basic Resource Study Division but may be deferred until the preliminary environmental studies have been completed.

DIVISION II

Resource Utilization Studies

This division will be concerned with the study of practices involved in the reclamation, utilization management and maintenance, and improvement of resources.

The nature of the investigations and the specific technical projects adopted will depend a great deal upon the facts provided by the basic resource studies.

Four main fields of study will be developed within this division :

1. Pasture research.....native pasture reclamation, pasture and stock management, reseeding of native pastures, sown pastures, nutritive values of pastures, conservation.
2. Crop agronomy.....crop varieties, cultural methods, with particular reference to water and soil conservation, agricultural land utilization, crop or crop and pasture rotation, conservation of products.
3. Silviculture.....studies of species and cultural methods with particular reference to fuel production, wind breaks and shade trees, combined tree and pasture plantations, use of certain land types for forest products, assessment of the true forest potential of arid areas.
4. Irrigation investigation.....this will be concerned with specific problems of irrigation related to arid and semi arid areas and particularly to areas where supply of irrigation water is restricted, thus the study of the most efficient use of water will be a major part of this work. Problems of salinity and of rise in water table and such problems will also be investigated.

DIVISION III

External Liaison

An Arid Zone Research Institute must take into account the possible utilization of wind power for lifting water, solar energy for heating and the possibilities of utilizing other forms of fuel than wood and of such physical and chemical processes as desalination of brackish water. All of these studies are in the field of physical and chemical engineering and the basic studies are the responsibility of other national laboratories. The Institute must remain constantly in touch with the progress in these fields and also keep the national laboratories informed of the particular needs of the arid and semi arid areas in regard to these investigations. For this purpose the inclusion of a liaison officer is recommended to maintain and develop these contacts. At a later stage when these investigations have progressed to a point where processes are being applied, a need will exist for field assessments and comparisons. At this stage the Institute may need to expand this liaison activity into a division to conduct this type of investigation which will not be part of the national laboratories programmes.

DIVISION IV

Human Factor Studies

The broad problem of arid and semi arid areas in India is one of human ecology in that the population has increased to the point that with existing methods of land utilization, there is an accelerated deterioration in productivity. The results of research in the other divisions of the Institute will be to provide methods which will change this land utilization and with it the practices, the domestic economy, sources of income and habits of the people. The results of research must be of a kind that they are acceptable and applicable to this changing society, while on the other hand the society has to be conditioned to accept these results. For this reason it is just as essential to study the human socio-economic aspects of the present society to understand what are the limiting factors in application and change as it is to study the actual methods of land utilization. Too often research stops before the technical results are utilizable by the people.

This group will have two main fields of investigation ; sociological and economic.

DIVISION V

Special Animal Studies

A variety of special problems in the field of animal nutrition, physiology and ecology related to the arid and semi arid environment are certain to emerge as the work of the Institute progresses. Even at this stage there is the problem of rodent ecology which must be studied if a method of control is to be exercised. Birds and insects of a useful or harmful nature will need to be studied and as the results of pasture and crop research lead to changes in animal diet and in animal husbandry, there are likely to arise specific problems in animal nutrition and animal physiology which will require investigation.

S E R V I C E S

The complete plan of organization for the Institute must include essential services such as general administration, library and bibliographical service, drafting and carto-graphic service, statistical service, photographic service, transport and work-shop.

A SUGGESTED STAGE DEVELOPMENT

It is recommended that during the remaining part of the Second Five Year Plan, the objective should be the establishment of divisions for basic resource study, resource utilization study, and human factors study. During this period the preliminary basic resource survey should be made, the general picture concerning the human factor established, and a beginning made on the more obvious problems of resource utilization.

During the third five year plan, the division for special animal studies and liaison in physical and chemical engineering should be established and there should be an expansion of the research facilities in the other three divisions which during this phase will have accumulated sufficient facts and experience to be able to analyse problems more accurately and thus to define more fundamental aspects.

During this period also there should be established a series of branch stations in selected environments chosen from the information gained by the basic resource survey. As these branch stations will be placed in selected type environments, they will appropriately emphasize different aspects of research but will also provide a series of environments for comparative and correlative studies in specific fields.

During the subsequent five year plan the Institute should develop more fundamental and perhaps academic work related to changing productive potential of arid and semi arid environments and this may involve the expansion of sections within the divisions.

S T A F F I N G

The success of the Institute will be dependent upon its staff. In certain fields it may be difficult to find suitably qualified and experienced personnel and the training of staff by overseas fellowships or by other means should be accepted as part of the concept of the Institute. This aspect requires special consideration and will be discussed further in the report.

DRAFT

SUGGESTED U. S. ASSISTANCE TO INDIA'S
SOIL AND WATER CONSERVATION AND USE PROGRAM

DRAFT

(For discussion 28 February 1959)

The following is based on discussions between Dr. J. K. Basu, Senior Soil Conservation Director, MFA and TCM Agriculture Division officials on 17 February 1959:

Period of assistance: From now through third 5-YEAR Plan - under Project No. 86-12-156 unless otherwise indicated.

I. TECHNICIANS

- A. Assigned to Center - with headquarters in New Delhi or other locales as need indicates.

No. of Persons

Title or Specialty

- | | |
|---|--|
| 1 | Team Leader - Senior man; well experienced in U. S. Soil Conservation Service; good administrator.

(Vice Nixon) |
| 1 | Agricultural Engineer - Senior man; well experienced in Irrigation, Drainage and Reclamation (especially of water-logged and saline soils).

(Vice Signell and Muirheid) |
| 1 | Agronomist - Senior man; well experienced in Grassland Management, including pasture rotation and grazing.

(Speer and Hull now assigned) |
| 1 | Soil Survey Specialist - Senior man; well experienced in various facets of soil survey work.

(Nomination pending) |

(For discussion 28 February 1959)

The following is based on discussions between Dr. J. K. Basu, Senior Conservation Director, MWA and TCM Agriculture Division officials on 28 February 1959.

Kind of assistance: From now through third 5-Year Plan - under Project No. 86-12-156 unless otherwise indicated.

TECHNICIANS
A. Assigned to Center - with headquarters in New Delhi or other

localities as need indicates.

<u>No. of Persons</u>	<u>Title or Specialty</u>
1	Team leader - Senior man; well experienced in U. S. Soil Conservation Service; good administrator.
1	(Vice Nixon) Agricultural Engineer - Senior man; well experienced in irrigation, drainage and reclamation (especially of water-logged and saline soils).
1	(Vice Signell and Mitchell) Agronomist - Senior man; well experienced in Grassland Management, including pasture rotation and grazing.
1	(Speer and Kull now assigned) Soil Survey Specialist - Senior man; well experienced in various facets of soil survey work.

(Nomination pending)

No. of Persons

Title or Specialty

- | | |
|---|---|
| 1 | Soil and Water Conservation Training Specialist - Senior man; well experienced in training both research and field workers in soil and water conservation and use.

(Taylor now assigned) |
| 1 | Soil and Water Conservation Information Specialist - well experienced in preparation and dissemination through various media of information on soil and water conservation and use.

(Should be assigned to Extension Wing, MFA, under Project 86-11-007 for this specific work.) New position. |
| 1 | Forestry Specialist (new position) - well experienced in development of farm forests and farm windbreaks. |
| 1 | Farm Management Specialist - Senior man; well experienced in Conservation Farm Planning. (Should be assigned to Directorate of Economics and Statistics, MFA, under Project 86-14-043 for this specific work. |

Total Number of Technicians: 8

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No. of Persons	Title or Specialty
1	Soil and Water Conservation Training
1	Specialist - Senior man; well experienced in training both research and field workers in soil and water conservation and use.
1	(Taylor now assigned)
1	Soil and Water Conservation Information
1	Specialist - well experienced in preparation and dissemination through various media of information on soil and water conservation and use.
1	Should be assigned to Extension Wing, WPA, under Project 86-11-007 for this specific work. New position.
1	Forestry Specialist (new position) - well experienced in development of farm forests and farm windbreaks.
1	Farm Management Specialist - Senior man; well experienced in conservation farm planning. (Should be assigned to Directorate of Economics and Statistics, WPA, under Project 86-1A-043 for this specific work.)
Total Number of Technicians: 8	

Section was on
 soil conservation
 and erosion control

B. Assigned to States - with headquarters as need indicates

1. To assist with the planning and implementation of the 40 soil and water conservation and use schemes planned in 9 States.

No. of Persons

Title or Specialty

4

Conservation Farm Planning Specialist
Intermediate-level technician; well
qualified in Conservation Farm Planning
with good background in economics.

4

Watershed Management Specialist -
Intermediate-level technician; well
qualified in watershed management with
good background in implementation of
area conservation schemes.

Total No. of Persons: 8

A portion of the funds to be provided to the 9 States by the Center should be specifically earmarked to cover the rupee costs of these eight technicians who would be assigned, in principle, two each in Regions I, II, IV and V. The regional breakdown would be as follows:

Region No.

States Included

I

Uttar Pradesh
Madhya Pradesh

II

Punjab
Rajasthan

III

W. Bengal
Orissa
Assam
Bihar

(Since only Bihar in Region III is included in the scheme, the technicians assigned to Region I could also assist Bihar.)

B. Assigned to States - with headquarters as need indicates

I. To assist with the planning and implementation of the AD soil

and water conservation and use schemes planned in 9 States.

<u>No. of Persons</u>	<u>Title or Specialty</u>
4	Conservation Farm Planning Specialist

Intermediate-level technician; well

qualified in Conservation Farm Planning

Specialist with good background in economics.

Water Resources Management Specialist -

Intermediate-level technician; well

qualified in watershed management with

good background in implementation of

water use conservation schemes.

Total No. of Persons: 8

A portion of the funds to be provided to the 9 States by the Center

should be specifically earmarked to cover the major costs of these eight

technicians who would be assigned, in principle, two each in Regions I, II,

IV and V. The regional breakdown would be as follows:

<u>Region No.</u>	<u>States Included</u>
I	Uttar Pradesh Madhya Pradesh
II	Punjab Rajasthan
III	W. Bengal Orissa Assam Bihar

(Since only Bihar in Region III is included in the scheme, the technicians assigned to Region I could also assist Bihar.)

Region No.

States Included

IV

Bombay
Andhra Pradesh

V

Mysore
Madras

Although certain States are not included under the scheme; ie. Himachal Pradesh in Region II, the several in Region III and Kerala in Region V, the assigned technicians could render assistance to these States upon request and as time would permit.

2. Other Assistance

In addition to the above eight technicians which would be assigned regionally to assist with the 40 Center-supported projects, the individual States may request further assistance on special but related problems in the general field of soil and water conservation and use. For instance, there are at the present time four requests in various stages of processing:

Uttar Pradesh - The nomination of Jack Griffin, Agricultural Engineer, was made by TCM on February 3, 1959 to provide services to this State's Planning, Research and Action Institute at Lucknow.

Himachal Pradesh - This State has initiated a request for a technician to assist with the Bakra watershed problem.

Punjab - This State has indicated the need for an Irrigation and Drainage Engineer.

Rajasthan - This State has indicated the need for either a Soil and Water Conservation Engineer or possibly an agronomist specialized in grassland management.

*a) Soil Conservation
b) Drainage
c) Irrigation*

It is possible that the technicians who are assigned to the Center and regionally can meet certain of the State's requirements,

States Included

Region No.

- Bombay
- Andhra Pradesh
- Mysore
- Madras

IV

V

Although certain States are not included under the scheme; i.e.

Himachal Pradesh in Region II, the several in Region III and Kerala in

Region V, the assigned technicians could render assistance to these

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to assist with the Baira watershed problem.

Punjab - This State has indicated the need for an investigation and

Drainage Engineer.

Rajasthan - This State has indicated the need for either a Soil and

Water Conservation Engineer or possibly an agronomist specialized in

grassland management.

It is possible that the technicians who are assigned to

the Center and regionally can meet certain of the State's requirements.

and for this reason such requests from the States should be carefully scrutinized to avoid duplication of services. However, it should be recognized that special needs do exist in the individual States which cannot be met by assistance which would be provided to the Center and regionally. The needs of the Planning, Action, and Research Institute in Lucknow and of H.P. in connection with the Bakra watershed probably illustrate such instances.

II. PARTICIPANTS

A. From the Center

*main
from
state with
9*
The Center should select two to four persons each year from now throughout the third 5-Year Plan period for training abroad. The periods of such training would normally be from 6 to 12 months to be determined on a case by case basis. However, study and observation tours of less than 6 months should be provided for selected key officials who are giving and will continue to give leadership and direction to the program.

B. From the States

The States should designate for training abroad at least two persons each year from now throughout the third 5-Year Plan period. The period of training would be from 6 to 12 months with shorter tours abroad for selected officials giving direction to the program.

Each State should be encouraged to participate in the training program abroad whether or not it takes part in the 40 Center-supported conservation schemes.

II. COMMODITIES

Essential commodity needs to support the activities in which the technicians will be engaged should be formulated as soon as possible and

and for this reason such requests from the States should be carefully scrutinized to avoid duplication of services. However, it should be recognized that special needs do exist in the individual States which cannot be met by assistance which would be provided to the Center and regionally. The needs of the Planning, Action, and Research Institute in Jackson and of R.P. in connection with the Delta watershed probably illustrates such instances.

PARTICIPANTS

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B. From the States

The States should designate for training abroad at least two persons each year from now throughout the third 5-Year Plan period. The period of training would be from 6 to 12 months with shorter tours abroad for selected officials giving direction to the program. Each State should be encouraged to participate in the training program abroad whether or not it takes part in the 40 Center-supported conservation schemes.

COMMODITIES

Essential commodity needs to support the activities in which the technicians will be engaged should be formulated as soon as possible and

considered an integral part of the overall technical assistance plan.

Recommendation

In principle, the commodity component cannot exceed 20 per cent of the total combined cost of the technicians, participants, and commodities for the entire period of the project. The extent to which the above plan of assistance can be implemented must necessarily be limited by the availability of TC funds from year to year (governed in large part by annual decisions of the U.S. Congress) and,

assuming Estimated # Costs of the Proposed TC Assistance, the ability to

I. Technicians the needed number of technicians and to physically implement

<u>Assignment</u>	<u>No.</u>	<u>Man-Yrs. Each (Av)</u>	<u>Total Man Yrs.</u>	<u>Cost Per Man Year</u>	<u>Total Cost</u>
A. Center	8	4	32	\$20,000.	\$640,000.
B. States	<u>12</u>	4	<u>48</u>	20,000	<u>960,000.</u>
Total	20		80		\$1,600,000.

II. Participants

<u>Source</u>	<u>No. per Yr.</u>	<u>No. of Yrs.</u>	<u>Total No. Parts.</u>	<u>Cost per Part.</u>	<u>Total Cost</u>
A. Center	3	6	18	\$6,500.	\$117,000.
B. States	<u>28</u>	6	<u>168</u>	6,500.	<u>1,092,000.</u>
Total	31		186		\$1,209,000.

III. Commodities - thru FY 1965

600,000.

GRAND TOTAL

\$3,409,000.

IXXVIII

Phasing of the Assistance

It will be necessary for budgeting and planning purposes, and for implementation of the plan, to breakdown each of the three components (technicians, participants and commodities) in specific terms on a year by year basis.

Reservation

assumes full program approval and availability of funding, the ability to year (governed in large part by annual decisions of the U.S. Congress) and, must necessarily be limited by the availability of TC funds from year to total amount of the assistance program, and the extent to which the above plan of assistance can be implemented. In addition, the assistance program must be subject to the extent of the reservation.

other aspects of the plan.			
Category	Amount	Year	Total
Center	8	1964	8
States	12	1965	12
Total	20		20

other aspects of the plan.			
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Center	8	1964	8
States	12	1965	12
Total	20		20

other aspects of the plan.			
Category	Amount	Year	Total
Center	8	1964	8
States	12	1965	12
Total	20		20

It will be necessary for budgetary and planning purposes, and for documentation of the plan, to provide each of the above components (Center, States, and Territories and possessions) in specific terms on a year by year basis.

Feb 28

Memo to Dr. Ensminger:

Re: Technical Assistance from the U.S. in soil and water conservation.

With Dr. Frank Parker, I have already discussed the following with Dr. Uppal, Commissioner of Agriculture and the Soil Conservation Board, which does not include fertilizers:

Center Team.

- 1 Team leader - a very experienced senior man in soil conservation.
- 1 Conservation engineer - Irrigation and drainage, especially waterlogged soils.
- 1 Agronomist (already assigned)
- 1 Soil scientist (soil survey)
- 1 Soil conservation training specialist. (already assigned)
- 1 Soil conservation information specialist.
- 1 Farm forestry specialist or woodland conservationist
- 1 Farm management specialist experienced in conservation farm planning.

Assigned to the field to help with 40 new soil and water conservation schemes:

- 4 Soil conservationists skilled in farm planning.
- 4 Soil conservationists experienced in watershed management.

Besides, I feel that at the very least Punjab, Uttar Pradesh, and Rajasthan should each have an experienced soil conservation engineer skilled in irrigation, drainage, and land leveling.

1945
The extent to which the work of the Soil Conservation Service is being carried out in the various States is being reported to the Department of the Interior.

Get Technical Assistance from the U.S. in soil and water conservation.
With Dr. Frank Porter, I have already discussed the following with
Dr. Porter, Undersecretary of Agriculture and the Soil Conservation Service,
which does not include the following:

Center Term

- 1 Team leader - a very experienced center man in soil conservation.
- 1 Conservation engineer - Irrigation and drainage, especially waterlogged soils.
- 1 Agronomist (already assigned)
- 1 Soil scientist (soil survey)
- 1 Soil conservation training specialist (already assigned)
- 1 Soil conservation information specialist
- 1 Team forestry specialist or wildlife conservationist
- 1 Team management specialist experienced in conservation team planning.

Assigned to the field to help with the soil and water conservation

Advisers

- 4 Soil conservationists skilled in team planning.
- 4 Soil conservationists experienced in watershed management.
- Besides, I feel that at the very least Forest, Water, Fisheries, and
Recreation should each have an experienced soil conservation engineer
skilled in irrigation, drainage, and land leveling.

Himachal Pradesh needs an expert on erosion control for the hilly catchment area back of Bhakra Dam.

To help with the newly expanding soil survey program, besides the very senior man at the Center, slightly less senior men with good experience as party leaders should be available in each of the 4 soil survey regions, preferable located with the soil correlator.

Not counting the fertilizer work, I should recommend a total of not less than 8 for the Center and not less than 20 in the States.

In view of the very large estimates in the Third Plan for soil conservation, both the Center and each of the States should pick out 2 to 3 of their very best soil scientists and soil conservationists for foreign training of periods of one to two years. The individuals should be located at American colleges or universities with strong work in this field, including active participation in the field programs of soil and water conservation. Examples include: University of Illinois, Iowa State College, Cornell University, Oregon State College, North Carolina State College, and the University of Wisconsin.

Although I am unable to be so specific, I urge that a first-class expert in fertilizer technology is needed to help, first the present Working Committee of the Ministry, and later a Center of Fertilizer Technology.

The technical assistance on soil fertility and soil testing should continue for sometime. Special attention should be given now to the fertility problems of maize and coconuts.

Some much needed assistance can be given better by experts from countries other than the United States, both for work in India and for training abroad. Examples include:

Belgian Congo: Tropical soils; geomorphology of tropical soils; shifting cultivation and other systmes for tribal people; culture of African oil palm.

Switzerland, France or Italy: Torrent control in the mountains.

Holland: Special problems of cat clays - organic-rich soils, influenced by sea water, that become very acid when drained.

Trinidad, Ghana, or Belgian Congo: Culture of Cacao.

Some much needed assistance can be given better by experts from countries other than the United States, both for work in India and for training abroad. Examples included:

Belgian Congo: Tropical soil; geology of tropical soils; shifting cultivation and other systems for tribal peoples; culture

of African soil.

Switzerland, France or Italy: Forest control in the mountains.

Holland: Special problems of soil - organic-rich soils, influenced

by sea water, that become very acid when drained.

Trinidad, Guyana, or Belgian Congo: Culture of Guano.

ESTABLISHMENT OF A FIELD EXPERIMENTAL STATION AND RESEARCH
LABORATORY IN KUTTANAD FOR STUDYING THE SOIL AND AGRONOMICAL
PROBLEMS AFFECTING THE KAYAL AND KARI LANDS.

Kuttanad, the rice bowl of Travancore, comprising an area of about 337 sq. miles, is an unique agricultural region in the world. Practically the whole of this area is about 4 feet below the sea level. For about four months, the entire cultivated area in this region is subjected to heavy floods. Four of the biggest rivers in Travancore-Cochin, besides many smaller ones pour their flood waters, during the monsoon, into these regions and submerge the area to a depth of 4 to 6 feet depositing large quantities of silt. When the rainy season is over and the floods recede, sea water from the bar at Cochin rushes into this region and contaminates the whole area with salinity beyond the toleration point for crops. Below the surface, and in some areas even on the surface, there is a deep layer of peat with very strong acidic reaction. A large part of the cultivated area of this region represents land reclaimed from the Vembanad Kayal, one of the backwaters of the Arabian sea.

Paddy is the most important crop in this region and its cultivation is the most risky agricultural operation done in any part of the world. It starts at the close of the rainy season every year by laying afresh or by strengthening, heavy mud embankments round the fields and pumping out 7 or 8 feet of water from within these enclosed fields. About 100 to 150 lbs. of half germinated paddy seeds are then sown which mature in 3½ to 4 months. All the time, round the field outside the embankment, water stands five to seven feet above the level of the fields, and constantly the waves lash disintegrating the bunds so laboriously laid and threatening to inundate and destroy the whole crop. Only one crop is raised and the average yield now is about 1,200 lbs per acre.

Facilities
as being
used by
the Govt.
Practically all the reclamation of this land and its cultivation are done by private effort and the Agricultural Department or the Government have rendered very little assistance in this work. The out-turn from these lands have been below expectation and there is evidence to show that the yield is steadily going down. It is only the high price of paddy that keeps the show going at present. The improvement of the present agricultural conditions and the maintenance of soil fertility are the serious problems which confront the cultivators of this region.

The exudation of acid from the peat down below, the annual contamination of the soil by the intrusion of sea water, the perpetual water logging and lack of drainage are problems which only modern scientific investigation can help to resolve. In addition to these there are several other problems arising from the peculiar seasonal and natural forces that interact in this region.

The more important soil problems of this region are enumerated below:

STATE OF TEXAS, COUNTY OF DALLAS, ss. I, the undersigned, a Notary Public in and for said County, do hereby certify that the within and foregoing is a true and correct copy of the original of the same as the same appears in the records of said County.

Witness my hand and the seal of said County at Dallas, Texas, this 1st day of January, 1917.

Notary Public in and for the County of Dallas, Texas.

Subscribed and sworn to before me this 1st day of January, 1917, at Dallas, Texas.

My commission expires the 1st day of January, 1918.

Attest my hand and the seal of said County at Dallas, Texas, this 1st day of January, 1917.

Notary Public in and for the County of Dallas, Texas.

Subscribed and sworn to before me this 1st day of January, 1917, at Dallas, Texas.

My commission expires the 1st day of January, 1918.

(1) Soil Acidity.

Preliminary investigations have shown that free sulphuric acid in highly toxic concentration is produced in these soils by the oxidation of sulphur compounds present in the soil. A practical and economic method of correcting acidity in these soils has to be evolved. High acidity often results in crop failure particularly in years of short rainfall and low water level in the lake. The cultivators are often required to let in salt water as the lesser of the two evils to neutralise the high acidity exuded from the sub soil which would otherwise destroy the crop.

(2) Lime depletion of the soils.

Closely associated with this is the problem of lime status of Kuttanad soils. This varies from place to place, but some areas show serious depletion of lime. A detailed survey of the whole tract is necessary to correct the lime requirements and fix optimum dose for different areas.

(3) Microbiological activity.

An important characteristic of the soils in this region is the absence of microbiological activity. Lack of this activity is the cause of low fertility of these soils. One of the main problems in this region is to encourage microbiological activity in these soils.

(4) Effect of Salinity.

The effect of the annual intrusion of sea water on the fertility and productivity of the soil requires investigation.

(5) Fertilizer Requirements.

The fertilizer requirements of the different kinds of soils found in this region and the reaction of the different fertilizers on these soils are problems about which practically nothing is known.

(6) Water Logging. There is then the problem of water logging. To what extent this region could be drained and how far the injurious salts could be removed by leaching is a subject for research and experimentation.

(7) Improved varieties of Rice.

No serious steps have been taken so far to produce improved varieties of rice suitable for this region. Early maturing, salt resistant and high yielding varieties will have to be evolved by selection and hybridization for increasing production in this region.

These problems cannot be solved by routine soil tests. Long-term fundamental research on all aspects of the problem by well trained scientists, conducted over a long period will alone open the way to solve these problems. The whole area is a rich mine of organic plant food store. If only methods can be discovered for

(1) Soil Salinity

Soil salinity is a major problem in arid and semi-arid regions. It is caused by the accumulation of soluble salts in the soil. The salts are usually sodium, calcium, and magnesium. The problem is caused by the evaporation of water from the soil, which leaves the salts behind. The salts can be toxic to plants and can also reduce the fertility of the soil. The problem is most serious in coastal areas where the water table is high and the salt water can seep into the soil.

(2) Saline Irrigation of Soils

Saline irrigation is a method of irrigation that uses salt water. It is used in areas where fresh water is scarce. The salt water is pumped into the soil, and the plants are able to tolerate the salt. However, the salt water can also cause the soil to become more saline, which can be a problem for the plants in the long run.

(3) Microbiological Aspects

Microbiological aspects of soil salinity are important to understand the problem. The high salt concentration in the soil can inhibit the growth of many microorganisms. This can lead to a reduction in the number of microorganisms that are able to break down organic matter in the soil, which can lead to a buildup of organic matter and a further increase in soil salinity.

(4) Effect of Salinity

The effect of salinity on plants is a major concern. High salt concentrations in the soil can lead to a reduction in the water uptake by the plants, which can lead to a reduction in the growth of the plants. The salt can also be toxic to the plants, leading to a reduction in the yield of the crops.

(5) Saline Water Management

Saline water management is a key issue in arid and semi-arid regions. It involves the use of salt water for irrigation and the management of the salt water in the soil. The goal is to reduce the salt concentration in the soil and to improve the fertility of the soil.

(6) Saline Land Reclamation

Saline land reclamation is a process of converting saline land into productive land. It involves the use of various methods, such as the application of fertilizers, the use of salt-tolerant plants, and the use of salt water for irrigation. The goal is to improve the fertility of the soil and to increase the yield of the crops.

(7) Saline Water Desalination

Saline water desalination is a process of removing the salt from salt water. It is used to produce fresh water for drinking and for irrigation. The process involves the use of various methods, such as distillation, reverse osmosis, and electrodialysis. The goal is to produce fresh water that is suitable for use in arid and semi-arid regions.

Saline water desalination is a key issue in arid and semi-arid regions. It involves the use of various methods, such as distillation, reverse osmosis, and electrodialysis. The goal is to produce fresh water that is suitable for use in arid and semi-arid regions. The process is expensive, but it is a necessary step in the development of these regions.

releasing the plant food so that they could be beneficially absorbed by the plant, the problems of this area would be solved.

Very recently two American Soil Scientists visited this region and after an extensive tour covering two days, stated that there were more soil and agronomical problems huddled up in this small region than in any other part of the world they have seen, and suggested the need for undertaking long term fundamental research.

If these problems are investigated and solutions found, the cultivated area in this region will be almost doubled and two crops of excellent paddy can be grown every year, where only one meagre crop is now raised. It is believed that the results of these investigations will be applicable not only to the whole of Kuttanad, but to many areas even beyond, covering a total area of about 2 lakhs acres now under rice. These investigations will therefore ultimately help to increase production of rice in the State by about 1.5 lakhs tons a year.

The Kuttanad area is a potential granery for paddy and coconuts. The Nanjinad area which has been developed with great effort and expenditure of money is gone out of the State. It is therefore essential that attention should now be concentrated in Kuttanad region to narrow down the present wide gap between production and the requirements of consumption in the State.

Recently Kuttanad problems have received some attention from Government and the construction of the spillway at Thottappally, and the Changanacherry-Alleppey road will help to improve conditions in this region. But nothing has been done so far to study the problems confronting agricultural production. Production from the land can be increased only by finding solutions for the problems enumerated above.

It is therefore proposed to establish a first class Research and Field Experimental Station in Kuttanad where the multifarious chemical, microbiological and agronomic problems of this area will be thoroughly investigated.

It is necessary to establish two sub Stations to work in close collaboration with the main Station to serve as local field experiment and demonstration centres. One of these sub stations will be in the kayal lands and the other in kari lands. Each of these sub stations will have a farm of 25 acres for fundamental studies.

In addition, it is proposed to establish six demonstration centres spread out throughout the tract and located on the different soil types found in this region. These centres will demonstrate all known methods of soil reclamation and of increasing production by the use of fertilizers. These demonstration plots will be located on lands leased for ten years and will be returned to the owners at the end of the period.

It is necessary to attack the problem on all fronts and on an intensive scale so that quick results may be obtained and demonstrated to the cultivators.

The work of breeding suitable varieties of rice for this region will be undertaken by the Rice Specialist whose appointment has recently been sanctioned by Government.

It is of supreme importance that an eminent Soil Scientist should be appointed as the Director of the proposed laboratory. If possible the services of such a Scientist should be obtained through the T.C.M. or through the scheme for the exchange of scientific workers through the Government of India.

The staff necessary is given below:-

1. Head of the Department of Chemistry.	...	Rs. 500-800
2. Head of the Department of Agronomy.	...	Rs. 500-800
3. Head of the Department of Microbiology.	...	Rs. 500-800
4. 3 Senior Scientific Officers.	...	Rs. 250-450
5. 6 Junior Scientific Officers.	...	Rs. 200-300
6. 1 Statistical Officer.	...	Rs. 250-450
7. 6 Farm Managers.	...	Rs. 200-300
8. 6 Fieldmen.	...	Rs. 40-100
9. 1 Store-keeper.	...	Rs. 40-120
10. 1 Library Clerk.	...	Rs. 40-120
11. 1 Electrician.	...	Rs. 40-120
12. 1 Superintendent.	...	Rs. 125-200
13. 1 Accountant.	...	Rs. 40-120
14. 2 Clerks.	...	Rs. 40-120
15. 2 Typists.	...	Rs. 40-120
16. 1 Laboratory Attenders.	...	Rs. 30-45
17. 12 Peons.	...	Rs. 25-35.

Contingent staff: (Jeep Driver, Motor boat Driver, Watchers, etc., according to need)

In addition to studying the soil and agronomic problems of Kuttanad, this Station will also undertake any soil investigations necessary in the rest of Kerala also.

It is suggested that the soil testing unit which is now being started in the Agricultural College at Vellayani should work in close collaboration with this Station.

The financial implications of the proposal are enclosed herewith.

FINANCIAL STATEMENT - SCHEME FOR SOIL RESEARCH IN KUTTANAD.

	First year. (6 months)	Second year.	Third year.	TOTAL
	Rs	Rs	Rs	Rs
<u>RECURRING EXPENDITURE.</u>				
<u>Staff - Pay and allowances.</u>				
1. Head of Department of Chemistry. (1) (Rs.500-800).	3,000	6,300	6,900	16,200
2. Head of Department of Agronomy (1) (Rs.500-800).	3,000	6,300	6,900	16,200
3. Head of Department of Microbiology (1) (Rs.500-800)	3,000	6,300	6,900	16,200
4. Senior Scientific Officers.(3) (Rs.250-450).	4,500	9,440	9,980	23,920
5. Statistical Officer (1) (Rs.250-450).	1,500	3,180	3,360	8,040
6. Junior Scientific Officers (6) (Rs.200-300).	7,200	15,120	15,840	38,160
7. Farm Managers (6) (Rs.200-300)	7,200	15,120	15,840	38,160
8. Superintendent.(1) (Rs.125-200).	750	1,590	1,680	4,020
9. Clerk (1) (Rs.80-150).	480	1,020	1,080	2,580
10. Accountant (1) (Rs.80-150).	480	1,020	1,080	2,580
11. Clerks. (2) (Rs.40-120).	480	1,032	1,104	2,616
12. Typists. (2) (Rs.40-120).	480	1,032	1,104	2,616
13. Store Keeper (1) (Rs.40-120)	240	516	552	1,308
14. Library Clerk (1)(Rs.40-120)	240	516	552	1,308
15. Electrician.(1) (Rs.40-120).	240	516	552	1,308
16. Fieldmen (6) (Rs.40-100).	1,440	3,096	3,312	7,848
17. Laboratory Attenders (4) (Rs.30-40).	720	1,488	1,536	3,744
18. Peons.(12) (Rs.25-35).	2,400	4,992	5,184	12,576
Dearness allowance (including Special Dearness allowance).	12,750	25,572	26,748	65,070
Travelling allowance.	5,000	10,000	10,000	25,000
Contingencies (Working expenses, etc.).	30,000	60,000	60,000	150,000
Total. ...	85,100	1,74,150	1,80,204	439,454
<u>NON-RECURRING EXPENDITURE.</u>				
1. Acquisition of land (for Research Laboratory and sub-stations).	1,50,000	...	...	150,000
2. Construction of buildings(at Headquarters and Sub stations and quarters).	1,00,000	2,50,000	50,000	4,00,000
3. Furniture.	25,000	75,000	...	1,00,000
4. Van and Motor Boat.	35,000	...	...	35,000
5. Equipments and Books.	1,00,000	1,50,000	...	2,50,000
Total. ...	4,10,000	4,75,000	50,000	9,35,000
GRAND TOTAL. ...	4,95,100	6,49,150	2,30,204	13,74,454

P. J. ...
FOR DIRECTOR OF AGRICULTURE.

S.P. Raychaudhuri, M.Sc., Ph.D(Lond.),
Sc(Cal. & Lond.), FRIC., FNI.,
Chief Soil Survey Officer.

S. Ray
XIII

P.F. 82/D.O.No. 2044
ALL INDIA SOIL AND LAND USE SURVEY,
INDIAN AGRICULTURAL RESEARCH INSTITUTE,

New Delhi March 9, 1959.

Dear Dr. Kellogg,

I am sending herewith a copy of my tour report from
14th February to 22nd February, 1959 to Madras, Cochin,
Trivandrum, Coimbatore, Ootacamund, Mysore and Bangalore in
your company in which you may be interested.

With kind regards,

Yours sincerely,

S. P. Raychaudhuri

(S.P. Raychaudhuri)

Dr. Charles E. Kellogg,
107, Claridge Hotel,
New Delhi:

spr : sks

Rajyachandhuri, M.Sc., Ph.D.(Lond.),
I. & Lond.), FRIC., FNI.,
Soil Survey Officer.

INDIAN AGRICULTURAL RESEARCH INSTITUTE,
ALL INDIA SOIL AND LAND USE SURVEY,
D.O.No. 3044

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With kind regards,

Yours sincerely,

S.P. Rajyachandhuri
(S.P. Rajyachandhuri)

Dr. Charles E. Kelloeg,
107, Claridge Hotel,
New Delhi:

apr : aks

INDIAN AGRICULTURAL RESEARCH INSTITUTE, NEW DELHI.
ALL INDIA SOIL AND LAND USE SURVEY.

Tour Report of Dr. S.P.Raychaudhuri, Chief Soil Survey Officer from 14th to 22nd February, 1959 to Madras, Cochin, Trivandrum Coimbatore, Ootacamund, Mysore and Bangalore.

Purpose: To accompany Dr. C.E. Kellogg, U.S.D.A. Soil Scientist, in his tour in Southern India under Ford Foundation Project for increased food production.

SECTION I

14.2.59 at New Delhi:

I left I.A.R.I. on 14.2.59 at 21.00 hours and reached Palam Air Port, New Delhi at 22.30 hours. At Palam Air Port, I met the following persons:

1. Dr.C.E. Kellogg
2. Shri P.D. Nair, Retd. Director of Agriculture, Kerala State.

We left Palam Air Port at 23.15 hours and reached Madras Air Port on 15.2.59 at 6.15 hours. I left Madras Air Port at 7.45 hours on the same day (15.2.59) and reached Cochin Air Port at 11.30 hours on the same date (15.2.59).

15.2.59 and 16.2.59 at Cochin:

At Cochin on 15.2.59 and 16.2.59, in addition to Dr. Kellogg and Shri P.D. Nair, I met the following persons:

1. Dr. M.S.Nair, Joint Director of Agriculture (Soil Conservation), Kerala State.
2. Shri N.S. Vaidyanathan, Superintending Engineer, Irrigation Section, Ernakulam.
3. Dr. O.J. Kelley, U.S.D.A. Drainage Expert, Ford Foundation Team.

16.2.59 at Trichur and Peechi:

Accompanied by Dr. Kellogg and Shri P.D.Nair and Dr.M.S. Nair , I left Cochin on 16.2.59 morning and reached Peechi via Trichur the same day. At Trichur and Peechi, we met the following persons:

1. Shri Mukundan, Dt.Agricultural Officer, Trichur.
2. Shri Abdul Azeez, Asstt.Engineer, Peechi Dam.
3. Dr. O.J.Kelley, U.S.D.A.Drainage Expert, Ford Foundation Team.

17.2.59 at Kottayam:

On 17.2.59 at 7.30 A.M. accompanied by Dr. Kellogg, Shri P.D.Nair and Dr. M.S. Nair, I left Cochin and reached Kottayam at 11 A.M. At Kottayam we met the following persons:

Tour Report of Dr. S.P. Raychaudhuri, Chief Soil Survey Officer
from 14th to 22nd February, 1959 to Madras, Cochin, Trivandrum
Colombatore, Coimbatore, Mysore and Bangalore.

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SECTION I

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I met the following persons:

1. Dr. C.E. Kellogg
2. Shri P.B. Nair, Retd. Director of Agriculture,
Kerala State.

We left Palam Air Port at 25.15 hours and reached Madras
Air Port on 15.2.59 at 6.15 hours. I left Madras Air Port at
7.45 hours on the same day (15.2.59) and reached Cochin Air Port
at 11.30 hours on the same date (15.2.59).

15.2.59 and 16.2.59 at Cochin:

At Cochin on 15.2.59 and 16.2.59, in addition to Dr.
Kellogg and Shri P.B. Nair, I met the following persons:

1. Dr. M.S. Nair, Joint Director of Agriculture (Soil
Conservation), Kerala State.

2. Shri M.S. Vaidyanathan, Superintending Engineer,
Irrigation Section, Travancore.

3. Dr. O.J. Kelley, U.S.D.A. Drainage Expert, Ford
Foundation Team.

16.2.59 at Trichur and Pechi:

Accompanied by Dr. Kellogg and Shri P.B. Nair and Dr. M.S.
Nair, I left Cochin on 16.2.59 morning and reached Pechi via
Trichur the same day. At Trichur and Pechi, we met the
following persons:

1. Shri Mukundan, Dt. Agricultural Officer, Trichur.
2. Shri Abdul Azeem, Asstt. Engineer, Pechi Dam.
3. Dr. O.J. Kelley, U.S.D.A. Drainage Expert, Ford
Foundation Team.

17.2.59 at Kottayam:

On 17.2.59 at 7.30 A.M. accompanied by Dr. Kellogg,
Shri P.B. Nair and Dr. M.S. Nair, I left Cochin and reached
Kottayam at 11 A.M. At Kottayam we met the following persons:

1. Shri M. Janardhanan Nair, Joint Director of Agriculture (Extension), Trivandrum.
2. Shri K. Raman Menon, Deputy Director of Agriculture (Trivandrum).
3. Shri P.M. Joseph, District Agricultural Officer, Kottayam.
4. Shri G. Gopalswamy, Chemical Assistant, Lemon Grass Scheme, Perambavoor.
5. Shri Mahadevam, Chemist, Parry & Co.

We left Kottayam on 17.2.59 at 13.00 hours and reached Trivandrum the same day at 19.00 hours.

18.2.59 at Trivandrum:

On 18.2.59 at Trivandrum, in addition to Dr. Kellogg, Dr. M.S. Nair and Shri P.D. Nair, I met the following persons:

1. Shri A.P.A. Britomutunayagam, Govt. Agricultural Chemist, Kerala State.
2. Mr. Earl I. Bacon, T.C.M.Extension Training Advisor.
3. Shri C. Achutta Menon, Minister for Finance and Agriculture, Kerala State.
4. Shri N.E.S.Raghabachari, Chief Secretary and Development Commissioner, Kerala State.
5. Shri C. Thomas, Secretary for Agriculture, Kerala State
6. Shri Siva Sankara Menon, Director of Agriculture, Kerala State.
7. Shri K.R.P. Nair, District Agricultural Officer, Trivandrum.

19.2.59 at Trivandrum:

On 19.2.59 at Trivandrum I met Shri G.K. Nair, Soil Survey Assistant in the All India Soil and Land Use Survey Scheme at Bangalore Centre.

19.2.59 at Coimbatore:

Dr. Kellogg and myself left Trivandrum on 19.2.59 and reached Coimbatore the same day at 12.40 hours. At the Govt. Agricultural College and Research Institute, we met the following persons:

1. Dr. S.V.Govindarajan, Soil Correlator, Red & Laterite Soils Region II, Bangalore.
2. Shri D. John Durairaj, Reader in Soil Science, Agricultural College, Coimbatore.
3. Shri G.K. Chidambaram, Assistant Soil Chemist, Analytical and Advisory.
4. Shri T.R.Sreenivasan, Assistant Soil Chemist, Expanded Soil Testing Service.

1. Shri N. Janardhanan Nair, Joint Director of Agriculture (Kottayam), Trivandrum.
2. Shri K. Ramachandran Menon, Deputy Director of Agriculture (Trivandrum).
3. Shri P.M. Joseph, District Agricultural Officer, Kottayam.
4. Shri G. Gopalakrishnan, Chemical Assistant, Iremam Grama Scheme, Perambalur.

5. Shri Mahadevan, Chemist, Parry & Co.

We left Kottayam on 17.2.59 at 12.00 hours and reached Trivandrum the same day at 12.00 hours.

18.2.59 at Trivandrum:

On 18.2.59 at Trivandrum, in addition to Dr. Kellogg, Dr. M.S. Nair and Shri P.D. Nair, I met the following persons:

1. Shri A.P.A. Prithimattayam, Govt. Agricultural Chemist, Kerala State.
2. Mr. Earl I. Bacon, F.G.M. Extension Training Adviser.
3. Shri G. Achutha Menon, Minister for Finance and Agriculture, Kerala State.
4. Shri M.S. Radhakrishnan, Chief Secretary and Development Commissioner, Kerala State.
5. Shri G. Thomas, Secretary for Agriculture, Kerala State.
6. Shri Siva Sankaran Menon, Director of Agriculture, Kerala State.
7. Shri K.P. Nair, District Agricultural Officer, Trivandrum.

19.2.59 at Trivandrum:

On 19.2.59 at Trivandrum I met Shri G.E. Nair, Soil Survey Assistant in the All India Soil and Land Use Survey Scheme at Bangalore Centre.

19.2.59 at Coimbatore:

Dr. Kellogg and myself left Trivandrum on 19.2.59 and reached Coimbatore the same day at 12.40 hours. At the Govt. Agricultural College and Research Institute, we met the following persons:

1. Dr. S.V. Govindarajan, Soil Correlator, P. & L. Institute, Solia Station II, Bangalore.
2. Shri D. John Mathias, Reader in Soil Science, Agricultural College, Coimbatore.
3. Shri G.K. Chidambaram, Assistant Soil Chemist, Analytical and Advisory.
4. Shri T.A. Sreenivasan, Assistant Soil Chemist, Expanded Soil Testing Service.

5. Shri C.X. Rajagopal, Assistant Soil Chemist, Oil and Seed Scheme.
6. Shri P.V. Anantharaman, Chemical Assistant
7. Shri Ravi Kumar, Chemical Assistant.

19.2.59 & 20.2.59 at Ootacamund:

Accompanied by Dr. Kellogg and Dr. Govindarajan, I left Government Agricultural College and Research Institute, Coimbatore at 16.00 and reached Ootacamund the same day (19.2.59) at 19.00 hours. At Ootacamund on 19.2.59 and 20.2.59, we met the following persons:

1. Dr. N.D. Rege, Soil Conservation Officer, Soil Conservation Research Training & Demonstration Centre, Ootacamund.
2. Shri Shanmughan, Assistant Agricultural Engineer, Madras State.
3. Shri S.C. Agrawal, Assistant Soil Cons. Engineer.
4. Shri B. Raghunath, Senior Scientific Asstt(Engineering)
5. Shri B.Sitaraman, Senior Scientific Asstt.(Agronomy).
6. Shri B.B. Bhattacharyya, Senior Sci. Asstt.~~(Forestry)~~
(Laboratory)
7. Shri S. Chinnamani, Senior Sci. Asstt. (Forestry).
8. Shri S.Ananda Rau, Chief Scientific Officer, UPASI.

20.2.59 at Rea Research Station, Devarsola:

Accompanied by Dr. Kellogg, Dr. Govindarajan, Dr. Rege and Shri Ananda Rau, I left Ootacamund at 10.45 hours and reached Devarshola at 13.00 hours. At Devarshola we met the following persons:

1. Shri V. Janyaraman, Chemist
2. Dr. C.S.Venkataramani, Pathologist.

Accompanied by Dr. Kellogg and Dr. Govindarjan, we left Devarshola at 13.30 and reached Bangalore the same day (20.2.50) at 19.30 hours.

21.2.59 at Bangalore:

On 21.2.59 at Bangalore we met the following persons:

1. Shri P.V.R. Rao, Chief Secretary and Development Commissioner, Mysore State.
2. Shri M. Mallaraj Urs, Director of Agriculture, Mysore State.

5. Shri G.K. Rajagopal, Assistant Soil Chemist, Oil and Seed Scheme.

6. Shri P.V. Anantharaman, Chemical Assistant

7. Shri Navi Kumar, Chemical Assistant.

19.2.59 & 20.2.59 at Ootacamund:

Accompanied by Dr. Kellogg and Dr. Govindarajan, I left Government Agricultural College and Research Institute, Coimbatore at 16.00 and reached Ootacamund the same day (19.2.59) at 19.00 hours. At Ootacamund on 19.2.59 and 20.2.59, we met the following persons:

1. Dr. H.D. Keger, Soil Conservation Officer, Soil Conservation Research Training & Demonstration Centre, Ootacamund.

2. Shri Shanmugham, Assistant Agricultural Engineer, Madras State.

3. Shri S.O. Agrawal, Assistant Soil Cons. Engineer.

4. Shri B. Rajanathan, Senior Scientific Asstt (Engineering)

5. Shri B. Sitarman, Senior Scientific Asstt. (Agronomy).

6. Shri B.E. Bhattacharyya, Senior Sol. Asstt. (Laboratory)

7. Shri S. Chinnamm, Senior Sol. Asstt. (Forestry).

8. Shri S. Ananda Rao, Chief Scientific Officer, UPASI.

20.2.59 at Res Research Station, Devarahola:

Accompanied by Dr. Kellogg, Dr. Govindarajan, Dr. Keger and Shri Ananda Rao, I left Ootacamund at 10.45 hours and reached Devarahola at 13.00 hours. At Devarahola we met the following persons:

1. Shri V. Jayaraman, Chemist

2. Dr. G.R. Venkatarmani, Pathologist.

Accompanied by Dr. Kellogg and Dr. Govindarajan, we left Devarahola at 13.30 and reached Bangalore the same day (20.2.59) at 19.30 hours.

21.2.59 at Bangalore:

On 21.2.59 at Bangalore we met the following persons:

1. Shri V.R. Rao, Chief Secretary and Development Commissioner, Mysore State.

2. Shri M. Mallaraj Urs, Director of Agriculture, Mysore State.

21.2.59 at Nandi Hill:

Accompanied by Dr. Kellogg, Dr. Govindarajan, Shri P.V.R. Rao and Shri Mallaraj Urs, we left Bangalore on 21.2.59 at 14.00 hours and reached Nandi Hill the same day (21.2.59) at 15.00 hrs. At Nandi Hill, at the Conference of Block Development Officers, of the Bangalore Division, I met Shri G.V.K. Rao, Secretary for Planning and Development, Mysore State.

I left Nandi Hill at 18.00 hours on 21.2.59 and reached Bangalore the same day (21.2.59) at 19.30 hours.

22.2.59 at Bangalore:

On 22.2.59 at Bangalore, Dr. Kellogg and myself visited the soil correlation laboratory of the Red and Laterite Soils Region II at 8 Kumara Park West Extension, Bangalore, and met there the Soil Correlator, Dr. S.V.Govindarajan.

Accompanied by Dr. Kellogg I left Bangalore by air on 22.2.59 at 11.00 hours and reached Palam Air Port, New Delhi the same day at 17.35 hours.

SECTION II

17.2.59 at Cochin, Trichur and Peechi:

Accompanied by Dr. Kellogg, Shri P.D. Nair and Dr. M.S. Nair, I left Cochin at 7.30 A.M. on 17.2.59 for Trichur and Peechi. We passed via Alwaye where we saw cutting of laterite rocks for the formation of bricks of two sizes viz., (1) 18" x 9" x 6" (cost is Rs. 10.00 per 100 bricks) and (2) 12" x 9" x 6" (cost is Rs. 7.50 per 100 bricks). The average cost of cutting 100 bricks is Rs. 4.00. Re. 1.00 per 100 bricks is paid to the owner of the land. The area we passed through is upland intersected by valleys. In the valley there is lift irrigation and usually two to three crops in the year are taken viz., (1) broadcast paddy during dry season - yield is 800-1200 lbs. per acre, (2) transplanted paddy during wet season - yield is 1600-1800 lbs. per acre and (3) third crop - sesamum, if possible.

In the uplands, tapioca, upland paddy, cashewnut, arecanut, betelnut, rubber etc. are taken.

The soils are laterite except for a thin strip along the coastal areas where the soil is sandy.

At Ollukara N.E.S. Block we saw cultivation of tapioca up and down the hilly slopes. We saw the Vellanikara Rubber Estate and I was told that there is a general tendency amongst the cultivators to cut down coconut and plant rubber since land ~~xxx~~ under coconut comes under ceiling price. In the Peechi ~~xxxx~~ village, we saw a bunded area where the bunds are in bad shape due to lack of maintenance of bunds. We also visited the Peechi Dam on River Manali which is irrigating 30,000 acres.

Regarding bunding work in the Kerala State for the conservation of soil and moisture, we were told that the work is carried out following the Travancore-Cochin Land Development Act No. 36 of 1950, according to which the farmers pay 75% of the cost in 15 equal instalments. The cost of earth bunding is Rs. 60.00 to Rs. 70.00 per acre. I emphasised to Dr. Nair that provision should be made for the maintenance of bunds by the villagers. Dr. Nair pointed out the difficulties by not having adequate staff under him for the work.

21.2.59 at Mandi Hill:

Accompanied by Mr. Kelloog, Dr. Govindarajan, Mr. V.R. Rao and Mr. M. S. S. on 21.2.59 at 14.00 hours and reached Mandi Hill the same day (21.2.59) at 15.00 hrs. At Mandi Hill, at the Conference of Block Development Officers, of the Bangalore Division, I met Mr. V.R. Rao, Secretary for Planning and Development, Mysore State.

I left Mandi Hill at 18.00 hours on 21.2.59 and reached Bangalore the same day (21.2.59) at 19.30 hours.

22.2.59 at Bangalore:

On 22.2.59 at Bangalore, Dr. Kelloog and myself visited the soil correlation laboratory of the Red and Laterite soils Region II at 8 Kumar Park West Extension, Bangalore, and met there the Soil Correlator, Dr. S.V. Govindarajan.

Accompanied by Dr. Kelloog I left Bangalore by air on 22.2.59 at 11.00 hours and reached Palam Air Port, New Delhi the same day at 17.35 hours.

SECTION II

17.2.59 at Gochin, Trichur and Pochin:

Accompanied by Dr. Kelloog, Mr. S.D. Kair and Mr. M.S. S. I left Gochin at 7.30 A.M. on 17.2.59 for Trichur and Pochin. We passed via Alway where we saw cutting of laterite rocks for the formation of bricks of two sizes viz., (1) 18" x 9" x 6" (cost is Rs. 10.00 per 100 bricks) and (2) 12" x 9" x 6" (cost is Rs. 7.50 per 100 bricks). The average cost of cutting 100 bricks is Rs. 4.00. The 100 bricks is paid to the owner of the land. The area we passed through is upland intersected by valleys. In the valley there is little irrigation and usually two to three crops in the year are taken viz., (1) broadcast paddy during dry season - yield is 800-1200 lbs. per acre, (2) transplanted paddy during wet season - yield is 1600-1800 lbs. per acre and (3) third crop - sesamum, if possible.

In the uplands, tapia, upland paddy, cashewnut, arecanut, betelnut rubber etc. are taken.

The soils are laterite except for a thin strip along the coastal areas where the soil is sandy.

At Ollikkal M.S.S. Block we saw cultivation of tapioca up and down the hilly slopes. We saw the Velankkara Rubber Batare and I was told that there is a general tendency among the cultivators to cut down coconut and plant rubber since land and under coconut comes under ceiling price. In the Pochin Kuma village, we saw a banded area where the bunds are in bad shape due to lack of maintenance of bunds. We also visited the Pochin Dam on River Mandi which is irrigating 30,000 acres.

Regarding bunding work in the Kerala State for the conservation of soil and moisture, we were told that the work is carried out following the Travancore-Gochin Land Development Act No. 36 of 1950, according to which the farmers pay 75% of the cost in 15 equal instalments. The cost of earth bunding is Rs. 60.00 to Rs. 70.00 per acre. I emphasized to Dr. Kair that provision should be made for the maintenance of bunds by the villagers. Dr. Kair pointed out the difficulties by not having adequate staff under him for the work.

We were also shown at Varandarapally village bunds by packing dry rubb~~les~~ at 10 ft. vertical fall at a cost of Rs. 200.00 per acre, 75% of which is realised from the farmers in 15 equal instalments. The height of the rubble bunds is 3 ft. to 3½ ft. In that particular area which is near the Cochin-Malabar Rubber Estate about 400 acres have been bunded by rubbles. Altogether 4,000 acres have been bunded with rubbles in the Kerala State.

Regarding the steps taken for increasing teak ~~forxinxerxxxx~~ ~~ing~~ plantations in the area, we were told that there is a system known as "Tangya System" in the estate according to which the land is given on lease for a period of 3 to 5 years for setting fire to the forest and raising teak plantations - and it remains as Government land.

Attempt has been made to grow Kenda-vine in between rubber trees - but has been given up, because it harbours snake.

17.2.59 on way from Cochin to Kottayam and at Kottayam:

On our way from Cochin to Kottayam we saw beautiful terraces for paddy cultivation and also dry land crops like lemon grass and pepper vine. We went by motor-boat on Vembaned Kayal in the Kuttanad area where the land is usually 4 to 6 ft. below water-level. Total Kuttanad area is about 150000 acres of which 120000 acres have already been reclaimed mainly for paddy and some coconut on bunds. The price of cultivated land in the area is about Rs. 1000.00 per acre. The place is a good centre for rearing ducks because of the availability of water. The bunds are made by using clay from the lake bed and putting ^{inside} bamboo ~~fencings~~ 3-4 ft. apart. Annually the bunds are strengthened and the water is pumped out. The same pump is used for irrigating the fields when necessary. Fertilizer used is 20 : 40 : 20 per acre in term of lbs. of N, P₂O₅ and K₂O respectively. Bonemeal is very popular in the area. The soils are acidic (pH 5.5 - 6.0) and bonemeal is very popular in the area. In the lower areas the soils are very rich in organic matter and highly acidic (pH = 3.0 approx.) and known as "Kari" soils which also grow paddy but the crop is poorer (yield about 800 lbs. per acre).

On our way to Trivandrum we halted at Mavelikara Community Block Development Officer and met there Shri Gopinath Nair, Block Development Officer and discussed with him the working of the Community Projects in general.

18.2.59 on way from Trivandrum to Cape Comorin:

We went to Cape Comorin by the Nanjinad area which is a highly productive area yielding in some areas upto 4000 lbs. of paddy per acre per crop. The paddy areas are under irrigation from the Peechippara Dam on the Kodayar River. We were told that the cost of the paddy land there is about Rs. 15000.00 per acre. These are mixed crops on the high lands and we were told that the lands are generally terraced near the road side but in the interior the land is not terraced with the result that the area there is very much subject to erosion.

18.2.59 Meeting at Government Secretariat at Trivandrum:

In the afternoon (3.30P.M.) of 18.2.59 we had a meeting in the room of Shri C.Achutta Menon, Minister for Finance and Agriculture, Kerala State where besides Dr. Kellogg and myself the following persons were present:

We were also shown at Varadachari village lands by packing dry rubbish at 10 ft. vertical fall at a cost of Rs. 200.00 per acre. 75% of which is realised from the farmers in 15 equal instalments. The height of the ridge lands is 5 ft. to 10 ft. In that particular area which is near the Kochi-Walayar border about 400 acres have been bunded by rubbish. Altogether 4,000 acres have been bunded with rubbish in the Kerala State.

Regarding the steps taken for increasing tree plantation in the area, we were told that there is a system known as "Tanya System" in the estate according to which the land is given on lease for a period of 5 to 7 years for setting live to the forest and raising tree plantations - and it remains as Government land.

Attempt has been made to grow rubber vine in between rubber trees - but has been given up, because it harbours snakes.

17.2.59 on way from Kochi to Kottayam and at Kottayam:

On our way from Kochi to Kottayam we saw beautiful terraces for paddy cultivation and also dry land crops like Jambon grass and pepper vine. We went by motor-bus on Vembanad Kaval in the Kuttanad area where the land is usually 4 to 6 ft. below water-level. Total Kuttanad area is about 15000 acres of which 12000 acres have already been reclaimed mainly for paddy and some coconut on bunds. The price of cultivated land in the area is about Rs. 1000.00 per acre. The place is a good centre for rearing ducks because of the availability of water. The bunds are made by using clay from the lake bed and putting Jambon grass 3-4 feet apart. Annually the bunds are strengthened and the water is pumped out. The same pump is used for irrigating the fields when necessary. Fertiliser used is 20 : 40 : 20 per acre in form of lbs. of N, P₂O₅ and K₂O respectively. Bonemeal is very popular in the area. The soils are acidic (pH 5.5 - 6.0) and soils are very rich in organic matter and highly acidic (pH = 3.0 approx.) and known as "Kari" soils which also grow paddy but the crop is poorer (yield about 800 lbs. per acre).

On our way to Trivandrum we halted at Mavelikara Community Block Development Officer and met there Mr. Gopinath Nair, Block Development Officer and discussed with him the working of the Community Projects in general.

18.2.59 on way from Trivandrum to Cape Comorin:

We went to Cape Comorin by the Mangalore area which is highly productive area yielding in some areas upto Rs. 4000 lbs. of paddy per acre per crop. The paddy areas are under irrigation from the Peechiappara dam on the Kodayar River. We were told that the cost of the paddy land there is about Rs. 15000.00 per acre. These are mixed crops on the high lands and we were told that the lands are generally terraced near the road side but in the interior the land is not terraced with the result that the area there is very much subject to erosion.

18.2.59 Meeting at Government Secretariat at Trivandrum:

In the afternoon (7.50 P.M.) of 18.2.59 we had a meeting in the room of Mr. G. Achutha Menon, Minister for Finance and Agriculture, Kerala State where besides Dr. Kellogg and myself the following persons were present:

1. Shri S. Achutta Menon, Minister for Finance and Agriculture, Kerala State.
2. Shri N.E.S. Raghavachari, Chief Secretary and Development Commissioner, Kerala State.
3. Shri C. Thomas, Secretary for Agriculture, Kerala State
4. Shri Siva Sankara Menon, Director of Agriculture, Kerala State.
5. Shri P.D. Nair, Retired Director of Agriculture, Kerala State.
6. Dr. M.S. Nair, Joint Director of Agriculture (Soil Conservation), Kerala State.

The Minister and the Chief Secretary told Dr. Kellogg that supply of adequate fertilizer in time is the most limiting factor of increased food production in the country. 25,000 tons of ammonium sulphate is the requirement of the State Government next year, but only a part of it is made available by the Central Government. Only one-third of the fertilizers used in the State is distributed through cooperatives which, generally, have not come forward to take up the work. We were told that the State Government is not prepared to give fertilizers on credit. We were told that the cooperative societies are functioning very well in the State. For the supply of phosphate to soils in the Kerala State, bonemeal and powdered hyperphosphate have been found to be very useful - single superphosphate has not been found much beneficial. There is also a great need for potassic fertilizers for soils of the Kerala State which is deficient in potassium and also because coconut plantations require a lot of potassic fertilizers.

Regarding supporting price for paddy, the Chief Minister stated that such minimum supporting price is wanted by States which are surplus in paddy, but not by States like Kerala which are deficient in paddy. We were told that Kerala State has got 70000 acres under teak. The area under rubber in the State is 2 lakhs and 98% of India's rubber is produced in Kerala. On ~~enquiry~~ enquiry from Dr. Kellogg, the Chief Secretary stated that there is a scheme in the State for growing African Oil Palm.

19.2.59 at Trivandrum:

In the morning of 19.2.59 I met Shri G.K. Nair, Soil Survey Assistant of the All India Soil and Land Use Survey Scheme at the Bangalore Centre. He is at present carrying out soil survey in the Nedu-Mangad Taluk in the Aruvikara Catchment. I advised him to carry out detailed soil survey in 3,500 acres of the catchment where soil conservation work is projected and also in the paddy fields.

19.2.59 at the Govt. Agri. College & Res.Instt., Coimbatore:

Dr. Kellogg gave a talk to the workers in Agricultural Chemistry at the College on the problems of soil conservation generally and on the factors which go to build up an ideal soil. A profile of black soil in the Agricultural College area was also examined. This black soil which was about 2½ ft. deep was formed on transported yellowish calcareous material.

1. Shri S. Aswath Menon, Minister for Finance and Agriculture, Kerala State.
2. Shri K. S. Nambiar, Chief Secretary and Development Commissioner, Kerala State.
3. Shri G. Thomas, Secretary for Agriculture, Kerala State.
4. Shri Siva Sankara Menon, Director of Agriculture, Kerala State.
5. Shri P. D. Nair, Retired Director of Agriculture, Kerala State.
6. Dr. K. S. Nair, Joint Director of Agriculture (Soil Conservation), Kerala State.

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Regarding supporting price for paddy, the Chief Minister stated that such minimum supporting price is wanted by States which are surplus in paddy, but not by States like Kerala which are deficient in paddy. We were told that Kerala State has got 70000 acres under teak. The area under rubber in the State is 2 lakhs and 98% of India's rubber is produced in Kerala. On rubber enquiry from Dr. Kelllogg, the Chief Secretary stated that there is a scheme in the State for growing African Oil Palm.

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Dr. Kelllogg gave a talk to the workers in Agricultural Chemistry at the College on the problems of soil conservation generally and on the factors which go to build up an ideal soil. A profile of black soil in the Agricultural College area was also examined. This black soil which was about 2 ft. deep was formed on transported yellowish calcareous material.

20.2.59 at Ootacamund:

At the Soil Conservation Research, Training and Demonstration Centre, Dr. Kellogg gave a talk to the staff of the Soil Conservation Centre on the factors for making an ideal soil and also for increased food production. The factors are (1) good drainage, (2) deep rooting zone i.e. the zone from which plant roots can draw up nutrients and (3) balanced supply of nutrients. He also emphasized that we should lay considerable stress on the supply of organic matter either in the form of green manure or compost for maintaining the soil structure. The only limiting factor in soil production should be sunlight, temperature and carbon dioxide of the area. The mapping and soil classification of units should change with soil interpretation. We examined the soil pit at Dodda Betta Cinchona Plantation at Ootacamund. This area is ~~about 40%~~ at 40% slope and well-known for the cultivation of medicinal plants such as cinchona, eucalyptus, red gum and blue gum trees etc. Out crop of charnokite rocks are most common in the locality. The ~~alt~~ elevation is about 8,200 ft. above mean sea level. The main rainfall in the area varies from 45" to 70" per annum and the temperature variation is between 20°F minimum and 90°F maximum. The profile characteristics are as follows:

Horizon	Depth	Description
A ₁	0" - 18"	7.5YR4/4, Dark brown, loam to silty clay loam, semi compact granular, pH about 6.0, no eff. with acid, abundant roots, moderate permeability, rich in organic matter. Well drained. Colluvium
A ₂	18" - 26"	M 5YR3/3, Dark reddish brown, silty clay loam, moderately massive. Slightly hard, stone line consisting of weathered iron concretions and small quartz particles. Moderately drained. Roots present.
B ₂	26" - 55"	M 5YR3/3, Dark reddish brown, silty clay loam. Moderately massive, pH about 5.5, no eff. with acid, stone line conspicuous with weathered iron concretions and very few particles of quartz. Few faint yellow mottlings. Moderately slow permeability roots very few.
B ₃	55" - 80"	M 7.5YR5/6, strong brown, clay, massive and firm structure, few black and yellow mottlings present, pH about 5.5; no eff. with acid, roots absent. Very slowly drained.

The soil can be classed as reddish brown latosol in the world group.

20.2.59 on way from Ootacamund to Devarshola:

On our way to Devarshola (Tea Research Station of the United Planters' Association of Southern India), we saw beautiful terraces on which potato is being grown. Two crops of potatoes are usually taken in the area, the first crop being sown in September and harvested in December and the second crop being sown in February to March and harvested in May. In between

10.2.59 at Ootacamund

At the Soil Conservation Research, Training and Demonstration Centre, Dr. Kallig gave a talk to the staff of the Soil Conservation Centre on the factors for making an ideal soil and also for increased food production. The factors are (1) good drainage, (2) deep rooting zone i.e. the zone from which plants roots can draw up nutrients and (3) balanced supply of nutrients. He also emphasized that we should lay considerable stress on the supply of organic matter either in the form of green manure or compost for maintaining the soil structure. The only limiting factor in soil production should be sunlight, temperature and carbon dioxide of the area. The mapping and soil classification of units should change with soil interpretation. We examined the soil pit at Doddabest-Gimhana plantation at Ootacamund. This area is situated at 40% slope and well-known for the cultivation of medicinal plants such as cinchona, eucalyptus, red gum and pine gum trees etc. Out crop of charnockite rocks are most common in the locality. The soil elevation is about 8,500 ft. above mean sea level. The main rainfall in the area varies from 45" to 70" per annum and the temperature variation is between 20°F minimum and 90°F maximum. The profile characteristics are as follows:

Horizon	Depth	Description
A ₁	0" - 18"	1.5YR4/4, Dark brown, loam to silty clay loam, semi compact granular, pH about 6.0, no eff. with acid, abundant roots, moderate permeability, rich in organic matter. Well drained. Colloidal.
A ₂	18" - 26"	1.5YR3/5, Dark reddish-brown, silty clay loam, moderately massive, slightly hard, stone line consisting of weathered iron concretions and small quartz particles. Moderately drained. Roots present.
B ₁	26" - 55"	1.5YR3/5, Dark reddish-brown, silty clay loam. Moderately massive, about 5.5, no eff. with acid, stone line conspicuous with weathered iron concretions and very few particles of quartz. Few faint yellow mottlings. Moderately slow permeability roots very few.
B ₂	55" - 80"	1.5YR2/6, Strong brown, clay, massive and firm structure, few black and yellow mottling present, pH about 5.5; no eff. with acid, roots absent. Very slowly drained.

The soil can be classed as reddish brown latosol in the world group.

10.2.59 on way from Ootacamund to Devarahola

On our way to Devarahola (Tea Research Station of the United Planters' Association of Southern India), we saw beautiful terraces on which potato is being grown. Two crops of potatoes are usually taken in the area, the first crop being sown in September and harvested in December and the second crop being sown in February to March and harvested in May. In between

sometimes a vegetable crop such as cabbage or a third crop of paddy is taken. On our way to Devarshola we saw the Pykara Dam. We saw tea plantations on the way. In between the tea plantations silver oak and wottle are used as shade plants. Shri Ananda Rau acquainted us with some of the problems of growing trees in the area. The main problem being the supply of adequate quantities of fertilizers. It was understood that the dry tea constitutes about 23% of the green leaf. For 100 lbs. of the dry tea, the following quantities of fertilizers are required in the area : 8 lbs. nitrogen, 3 lbs. P_2O_5 and 4 lbs. of K_2O .

20.2.59 on way from Devarshola to Bangalore:

We passed through good paddy areas near Serangapatam where 4,000 to 6000 lbs. of paddy per acre is grown. The area in Mandja grows lot of sugarcane and dry land crops like jowar, ragi and tur.

21.2.59 at the Mysore Govt. Secretariat, Bangalore:

We had discussion with Shri P.V.R. Rao, Chief Secretary and Development Commissioner of the Mysore State and Shri M. Mallaraj Urs, Director of Agriculture, Mysore State regarding the problems for increasing food production in the State. Shri Rao laid stress on the following two urgent problems:

1. Construction of new tanks and renovation and maintenance of old tanks and
2. Bunding for soil and water conservation in dry cultivation.

He stated that application of fertilizer is very necessary for areas under bunding. The existing LandImprovement Act in the Mysore State which lays down that 50 to 70% of the cultivators must agree to bunding before work can be taken up in the area is not enough and the new Act is under consideration to make the bunding programme compulsory. On an enquiry from Dr. Kellogg, Shri Rao stated that in his opinion, ^{consultation} ~~consultation~~ of holdings should be ~~a~~ tried in the State but should not be made obligatory. Dr. Kellogg mentioned that in his opinion ^{consultation} ~~consultation~~ of holdings for each farmer may not be necessarily in one continuous block but may be made in two or three blocks one ~~mark~~ ^{category} in each. Different kind of land which will reduce the number of fragmentation of holdings. Regarding Cooperative Societies in the State, Shri Rao stated that in practice such societies are run by 4 or 5 big people in each society and there is a lot of improvement in the working of these societies which however can be done only gradually. Regarding ceiling of land, Shri Rao stated that in his view, some ceiling is necessary for the socialistic pattern of society. On the other hand for waste lands which has to be put under cultivation such ceiling may not be beneficial. Answering to Dr. Kellogg, Shri Rao stated that the land ceiling will not prevent anybody to have income from other sources so that in his opinion there is no danger of promising boys being taken away from the villages. Further in his view mechanised agriculture is not expected to be at all used in India for some-time to come so that good system of agriculture has to be built up without using machinery and therefore comparatively smaller areas will be sufficient. On an enquiry from Dr. Kellogg, Shri Mallaraj Urs stated that there is a programme in the State for planting the following fuel trees in the villages which will ultimately provide more manure to the land: (1) Eucalyptus, (2) Casurina and (3) Pongamia glabra. Regarding price support,

sometimes a vegetable crop such as cabbage or a third crop of
paddy is taken. On our way to Devanahalli we saw the Mysore
new tea plantations on the way. In between the tea plantations
silver oak and wattle are used as shade plants. Shri Ananda Rao
acquainted us with some of the problems of growing trees in the
area. The main problem being the supply of adequate quantities of
fertilizers. It was understood that the dry tea constitutes about
25% of the green leaf. For 100 lbs. of the dry tea, the follow-
ing quantities of fertilizers are required in the area: 8 lbs.
nitrogen, 3 lbs. P_2O_5 and 4 lbs. of K_2O .

20.2.59 on way from Devanahalli to Bangalore:

We passed through good paddy areas near Geranagattur
where 4,000 to 6000 lbs. of paddy per acre is grown. The area
in Mandya grows lot of sugarcane and dry land crops like jawar,
ragi and tur.

21.2.59 at the Mysore Govt. Secretariat, Bangalore:

We had discussion with Shri V.V. Rao, Chief Secretary,
and Development Commissioner of the Mysore State and Shri M.
Malleswari Urs, Director of Agriculture, Mysore State regarding the
problems for increasing food production in the State. Shri Rao
laid stress on the following two urgent problems:

1. Construction of new tanks and renovation and maintenance
of old tanks and
2. Bundling for soil and water conservation in dry condi-
tion.

He stated that application of fertilizer is very necessary
for areas under bunding. The existing land improvement act in the
Mysore State which lays down that 50 to 70% of the cultivators
must agree to bunding before work can be taken up in the area
is not enough and the new act is under consideration to make the
bundling programme compulsory. On an enquiry from Dr. Kellogg,
Shri Rao stated that in his opinion, establishment of holdings
should be a tried in the State but should not be made obligatory.
Dr. Kellogg mentioned that in his opinion consolidation of hold-
ings for each farmer may not be necessarily in one continuous
block but may be made in two or three blocks one man in each
different kind of land which will reduce the number of fragments-
tion of holdings. Regarding cooperative Societies in the State,
Shri Rao stated that in practice such societies are run by 4 or
5 big people in each society and there is a lot of improvement
in the working of these societies which however can be done only
gradually. Regarding ceiling of land, Shri Rao stated that in
his view, some ceiling is necessary for the socialistic pattern
of society. On the other hand for waste lands which has to be
put under cultivation such ceiling may not be beneficial.
Answering to Dr. Kellogg, Shri Rao stated that the land ceiling
will not prevent anybody to have income from other sources so
that in his opinion there is no danger of promising boys being
taken away from the villages. Further in his view mechanised
agriculture is not expected to be at all used in India for some
time to come so that good system of agriculture has to be built
up without using machinery and therefore comparatively smaller
areas will be sufficient. On an enquiry from Dr. Kellogg, Shri
Malleswari Urs stated that there is a programme in the State for
planting the following trees in the villages which will
ultimately provide more manure to the land: (1) Eucalyptus,
(2) Casuarina and (3) Ficus religiosa. Regarding price support,

Shri Rao stated that the main difficulty of having a price support is the absence of an effective organization for working it. The organization should include honest workers and buildings of godowns for the storage of the food crops throughout the country. Such an organization will take two to three years to be built up and it is only after that the question may be considered. Shri Rao agreed that if this is done, the farmers will get incentive for increased food production. On an enquiry from Dr. Kellogg, Shri Rao stated that 50% of the time of Gram Sevaks of Community Projects is used for agriculture. Shri Mallaraj Urs also stated that about 20% of the Block Development Officers in the Mysore State are Agricultural Graduates who have worked also as Gram Sevaks.

21.2.59 at Nandi Hill:

We attended a conference of the Block Development Officers of the Bangalore Division at Nandi Hills from 4 P.M. to 6 P.M. in which the problems of the division in respect of soil conservation were discussed. In that meeting the general feeling was expressed that cultivators should be given more incentive for cooperation for making bunds on their lands for soil and moisture conservation.

SECTION III

Soils: The soils of Ootacamund Hills where we examined a soil profile have already been described under Section II.

S.P. Raychaudhuri 28.2.1959

(S.P. Raychaudhuri)

Chief Soil Survey Officer:

spr : sks

New Delhi, the 27th January, 1959.

SUBJECT:- TOUR NOTE AND MINUTES OF THE DISCUSSIONS
BETWEEN THE OFFICERS OF THE RAJASTHAN STATE
AND THE MINISTRY OF COMMUNITY DEVELOPMENT &
COOPERATION HELD AT JAIPUR ON THE 20TH JANUARY,
1959.

A copy each of the tour note and minutes cited
above is circulated herewith for information and necessary
action.

D. Singhal
(Darshan Singh)
Section Officer

All Officers in the Ministry.

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- | | |
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MINISTRY OF COMMUNITY DEVELOPMENT & COOPERATION

7/10
Tour note of a Team of Officers of the Ministry of Community Development & Cooperation on their visit to Rajasthan in the third week of January, 1959.

1. DELIMITATION OF BLOCKS:

The State has been delimited into 232 blocks out of which 122 are functioning at present.

AGRICULTURE

2. The emphasis which has been placed on wealth producing-extension is now clearly seen on the ground in the blocks. We have to ensure that Panchayats continue to place very great emphasis on improved agriculture and other production activities.

3. SOIL CONSERVATION & MEDH BUNDHI: -

We have had an opportunity to see both the Contour Bunding and Medh Bundhi rather extensively in different parts of the State. The contour Bunding has been organised with the aid of Subsidy @ 10 Rupees per acre and has covered 1200 acres. The quality of this work is quite good and the results have been appreciated by the farmers. In view of the growing demand it will be advisable for the State to organise this work on the lines of Medh Bundhi without involving heavy outlay by Government as the paucity of funds would otherwise limit the area to be benefitted. Rajasthan's programme is distinct from that in the Bombay State, where the entire cost of bunding is initially found by the State.

The State is to be congratulated for conceiving and executing the programme of Medh Bundhi on a large scale. This work of field bunding has been carried out without a large financial outlay and largely on the basis of self-help by the farmers though here and there loans have been advanced for this purpose but no subsidies have been given. These bunds have in almost all places served as anti-erosion and water conservation measures. The farmers have realised that had not the bunds been put up on the lands newly brought under cultivation, it would not have been possible to raise a crop of Rabi which mainly consisted of Gram and Wheat. Good sized blocks of 300 to 500 acres have been covered in some of the villages and this has created a great deal of enthusiasm in favour of additional crop production and adoption of better methods of cultivation.

Since these bunds must serve both the purposes of Boundary bunds and Contour Bunds they involve certain compromises and it is, therefore, necessary to construct smaller compartmental bunds with the help of a bullock driven bund former. These compartmental bunds would be constructed every year after the seed-bed is prepared for sowing. In some cases it is also necessary to provide proper water courses for the disposal of surplus water from the field.

In many places these bunds have enabled the land to be cropped for the first time in many years. On the fields which were already under cultivation these bunds have often contributed a 50% increase in production and a saving of at least one irrigation during the Rabi season. These bunds have helped both the Rabi and Kharif crops and provided a sound basis for building up the fertility of lands and for introducing the follow-up Dry Farming measures. In fact it will be advisable to recommend along with the Medh Bundhi, the necessary Dry Farming and fertility promoting measures as a composite pattern. This will involve the ploughing of the lands along the Contours and the sowing of the crops in lines and use of local manurial resources.

It has been reported that 3 lacs of acres have been covered by Medh Bundhi. It is suggested that preparations for the next drive be taken in hand from right now and training classes organised from the beginning of February, so that the work is organised properly and carried out along the lines suggested. The same set of trainers may be used so that they also benefit from discussions with the field staff who did the work during the last season.

In hilly areas, stone bunds or embankments have very frequently been put up and terraces constructed. This is a Land Reclamation measure and very much to be welcomed in view of the paucity of cultivable land in the hilly region.

4. LOCAL MANURIAL RESOURCES:-

The green manuring programme has started making an impact in the blocks as in many blocks between 800 to 1000 acres were green manured. This programme is practically confined to irrigated areas. In connection with this programme of Local Manurial Resources, the following suggestions are made:-

(1) Two lines of pulse crops like Guar, and Sunhemp may be sown on the periphery of all fields irrigated as well as unirrigated and this material may be cut at the flowering time and placed in compost pits dug on the borders of the fields. The compost so prepared may be used during the succeeding Kharif season. Any suitable pulse may be used for sowing these two lines which will be earmarked for the benefit of the fields. It is not necessary to carry this green material back to the village or to bring dung for the compost pits.

(2) A wider spacing may be adopted for Maize, Bajra and Jowar and intervening spaces cropped with pulses like Meth, Urid Chhauila or Kulthi which may be buried under to serve as strip green manuring. Where green manuring is not possible, the green stuff may be cut and put in the compost pits.

(3) On the borders of fields, on bunds and on waste lands shrubs like Karenj and Glyricidia may be planted so that they produce green leaves for green manuring or for Compost pits. These shrubs may be planted 5 to 6 feet apart and not allowed to grow beyond 7' to 8' in height.

(4) A loose box system of storing manure in the animal sheds may be adopted in the hilly areas and in other areas conservation of urine may be promoted.

For each district there should be a list of recommendations for building up the fertility of all different types of Soils both irrigated and unirrigated and this should be based on manures locally produced by the farmers without involving appreciable financial outlay.

The compost work is not yet making the expected progress despite the appointment of Compost Inspectors. The assistance of Gram-kakies may be sought for educating the village women and all the Extension Supervisors may concentrate on this basic work.

5. FERTILIZERS AND MANURES: -

The fertilizers are becoming quite popular in the blocks but a wider use of phosphatic fertilizer is yet to be promoted by teaching the farmers the adequate dosages and the proper placement of this fertilizer.

The use of fertilizers is at present confined largely to irrigated crops. The application of phosphates in fair quantities and of Nitrogenous fertilizers in limited quantities will prove helpful for most of the unirrigated crops. Demonstrations need to be laid out for this purpose on crops like Bajra, Jowar, small Millets, Urid, Mung, Gram and Chhauila. The block funds

funds provided for Agriculture can conveniently be used for the purchase of demonstration fertilizers and seeds. The Department of Agriculture should prepare a schematic programme for the utilisation of these funds.

6) SEED MULTIPLICATION:-

In each Gram Sewak's Circle atleast 7 registered Seed Growers had been appointed. This is a move in the right direction and should be followed up with the Village Seed multiplication and Distribution scheme so that much of handling and transporting of seed is avoided. Such programmes will have to be organized for all types of seeds. Sampling and checking arrangements may be made in selected Blocks for ascertaining the area under improved seeds. This can be easily done at the time of crop cutting experiments.

7) PLANT PROTECTION:-

The plant protection work is becoming quite popular and the sprayers, dusters and chemicals are being kept with the Panchayat for use by the farmers.

8) AGRICULTURAL IMPLEMENTS:-

The Rabi Campaign has helped significantly in the distribution of improved implements on an unprecedented scale. The field response to the implements should be carefully surveyed so as to avoid the creation of dumps of implements which are not used by the farmers. When implements are kept with Panchayats and other agencies for demonstration, a survey should be carried out to determine their use. Demonstration implements may be withdrawn from the Panchayats after some time and sets issued for being hired out to individual farmers.

9) PROGRAMME PLANNING:-

In the Rabi Campaign 3 lakh maunds of improved wheat seeds have been issued. Line sowing of crops has also been extended very considerably. Budding of bers has also caught on. Now that the Panchayats are taking interest in the agricultural work, it is necessary to turn their out look to self-improvement and self-help measures, rather than looking for outside financial help.

An attempt is being made to prepare Village Agricultural Plans. In the preparation of such plans, the Gram-Sahayak should be associated. Both the Gram Sahayaks and Panchayats are taking an active interest in the agricultural work. This work should not be allowed to languish for lack of follow up and contact.

10) SUPERVISION:-

Though the blocks are visited frequently by the D.A.Os. & Dy. Dirs. inspection notes are not generally written and sent to the Blocks. For strengthening the Technical Supervision, it is necessary that thorough inspection notes should be written so that proper guidance is available and a complete review of all agricultural work in the Blocks is carried out atleast once in a year.

ANIMAL HUSBANDRY

11. GENERAL :

Livestock play a very important role in the rural economy of the State. This fact has been fully appreciated by the State Government and much emphasis is placed on and importance given to the Animal Husbandry programme in the blocks.

12. STAFF :

(1) At Headquarters :- Action has been or is being taken by the Department regarding the provision of necessary staff including the subject matter specialists at Headquarters. It is understood that Government have already sanctioned the transfer of the Headquarters of the Deputy Director in-charge of sheep development from Bikaner, where it is located at present, to Jaipur where the Animal Husbandry Department has its Headquarters. This is in pursuance of the recommendation made by the Mount Abu Conference.

(2) Divisional Staff :- At present, only three Deputy Directors are in position for the five Revenue Divisions and it is learnt that the creation of another post of Deputy Director is under the active consideration of Government. Considering the vast area of each Revenue Division and the rapidly increasing workload and responsibilities devolved on each of the three existing Divisional Deputy Directors, the expenditure of sanction of the post of Deputy Director now under consideration of Government and the creation of another post of Deputy Director for the fifth Revenue Division are matters of importance to the Animal Husbandry Programme in the State and, therefore, need early consideration by the Government.

(3) Block Staff :- Regarding the block staff, however, the position continues to be unsatisfactory. Qualified veterinary graduates are in position in only 15 blocks, while less qualified (two year diploma holders) have been posted as Block Extension Officers in 84 Blocks. This arrangement is unavoidable because of the shortage of qualified veterinary graduates, despite the fact that the pay scale of this cadre of Officers in the State is by far the best obtaining in the country. It was stated that this is only a temporary arrangement and that it would be possible to replace most of the diploma holders by qualified veterinary graduates within about six months, when the next batch of about 90 veterinary graduates would be available from the State's Veterinary College for appointment.

It is gratifying that in view of the emphasis on sheep development in the block programme, especially in the arid regions of the State, a post of Sheep and Wool Extension Officer has been created in 27 blocks, in addition to that of the Animal Husbandry Extension Officer. This has rendered possible intensive attention to the development of sheep which play an important role in this region.

13. TRAINING :

(1) Stockmen :- It was stated that the stockmen training course which was being conducted hitherto at Bikaner Veterinary College has been discontinued recently and arrangements are being made to start a similar course elsewhere in the State. This needs to be expedited in view of the increasing demand for these men under the various livestock development schemes.

(2) V.L.Ws ' Training Centres :- Considering the importance

Importance of Animal Husbandry Programme especially in the Blocks of this State, there is need for providing facilities for practical training in Animal Husbandry in the V.L.W. Training Centres. It is gathered that at the instance of the Development Department, the Animal Husbandry Department has already submitted proposals for attaching demonstration units of Dairy, Poultry and Sheep to these Training Centres in order to provide necessary practical training facilities to the trainees. These proposals merit the early blessings of the State Government in order to enhance the usefulness of the training now being given in these Centres.

(3) Orientation Training :- There is need for giving orientation Training in the correct technique of Artificial Insemination, poultry keeping, pig rearing, sheep husbandry and inland fisheries to all the Animal Husbandry Extension Officers, diploma holders and stockmen working in the blocks. It is suggested that arrangements be made to impart training in suitable existing centres by further equipping them for the purpose, if necessary, and by deputing convenient batches of these Officers to undergo training for a total period not exceeding six weeks.

In order that the training may be useful and effective, suitable officers of the Department, who are to serve as trainers for these trainees, need to be deputed to institutions outside the State where the work is being undertaken on recognised lines, so that on their return they may be in a position not only to organise the work of the State in the respective fields on proper lines, but also arrange for suitable training being instituted for the trainees in these fields. The following institutions are recommended for the purpose :-

- (i) Key Village Scheme - Key Village Centres Kangayam and Hosur in Madras State.
- (ii) Artificial Insemination technique and Semen Banks- Regional Artificial Insemination Centre, Cuttack and Artificial Insemination Sub-Centres in Orissa State.
- (iii) Poultry Development in the Blocks-Kodamathur Block and Poultry Extension Units of the Arcot Mission Poultry Farm, Marthandam Block, Katpadi in Madras State.
- (iv) Poultry Farm-Model Poultry Farm, Delhi State.
- (v) Piggery Development-Central Dairy Farm, Aligarh, Uttar Pradesh.
- (vi) Artificial Insemination in Sheep-Himachal Pradesh and Jammu and Kashmir.

Orientation training in extension technique needs also to be given to the District Officers. This could be done in each division under the immediate direction and guidance of the respective Deputy Directors of the Division by deputing the District and other Officers for a week or so to a block where the work done under the programme is considered satisfactory.

14. SUPERVISION:

= The proforma prescribed for the inspecting Officers at various levels for the inspection of the block Animal Husbandry Programme needs to be suitably revised copies of the proforma prescribed in Bihar and Orissa States are being supplied separately to serve as guides.

15. DELEGATION OF POWERS :-

Financial powers delegated to the District Officers need to be revised commensurate with the responsibilities devolved on them. The powers obtaining in Bihar and Punjab States may be considered in this connection.

16. PROGRAMME :

- (1) Artificial Insemination :-

The recommendations of Mount Abu Conference regarding

regarding the establishment of Semen Banks for increasing the efficiency of A.I. Service is under the active consideration of the Department and early action needs to be taken for implementing it.

The equipment at present provided in the various Artificial Insemination Centres of the State is not in conformity with the standard list of equipment recommended under the Key Village Scheme. The provision of a full complement of equipment is necessary to ensure maximum usefulness from this technique. The technique adopted in the A.I. Centres admits of much improvement and observance of strict aseptic precautions need-s to be given considerable emphasis. Further training of the men engaged in A. I. Centres is necessary follow up of sterility cases needs to be further intensified and the staff requires more training in the diagnosis and treatment of sterility. The officers recommended to be deputed to Cuttack should also acquaint themselves with this work so that they may organise sterility treatment service properly.

The State has not yet taken up Artificial Insemination in sheep, as recommended by the Mount Abu Conference. This may be due to the fact that there is no shortage of breeding rams. Nevertheless, as the Government farms begin to produce high yielding progeny tested rams which are necessarily limited in number, it would be desirable to introduce Artificial Insemination in order to extend the usefulness of the selected rams for a larger number of ewes than is otherwise possible. It is suggested that a few selected Officers of the State be deputed to Jammu and Kashmir State and Himachal Pradesh for training in Artificial Insemination in sheep.

(2) Veterinary Dispensaries :- The distribution of Veterinary dispensaries is far too inadequate for the vast livestock population. There seems also to be a somewhat inequitable distribution of veterinary dispensaries in the blocks. 196 veterinary dispensaries are located in 84 blocks which works out at an average of over 2 institutions per block, while in 14 blocks, there are no veterinary institutions of any kind. It is learnt that arrangements are being made to open veterinary dispensaries in all these blocks. One of the important recommendations made by the Mount Abu Conference in this regard was to provide at least one full fledged veterinary institutions under the charge of a qualified veterinary graduate and at least two part-time institutions or stockmen centres under the charge of a qualified stockman or a diploma holder in each block. This does not seem to have been achieved in any of the blocks. Considering that the average livestock population in each block is nearly 60,000 of bovines and as many sheep, it is imperative that the recommendations of the Mount Abu Conference should be given early consideration in the matter of opening veterinary institutions in order to expend adequate veterinary aid to the livestock.

(3) Sheep Breeding :- With its large sheep population which is nearly 1/5th of the total of the country and with as many as 7 distinctive breeds of sheep, Rajasthan is the leading wool producing State in India, accounting for nearly 1/3rd of the country's total wool output. Specially much emphasis is laid on sheep development in areas especially of the arid region and private breeders are encouraged to come into the picture in larger numbers by adequate inducements. Five Government Sheep

Contd...6

Sheep breeding farms have been established in the home-tracts of the important breeds, and proposals for establishing 3 more Government farms in their respective breed tracts are said to be under active consideration.

It is necessary that the establishment of these farms should be expedited in order to enable intensive scientific work including progeny testing of the rams being taken up on these farms.

The State Government has established community shearing sheds in 46 blocks and proposals for establishing another 53 centres are under active consideration. The object of these shearing centres is to introduce primary classing and grading of wool so very essential for improving the economic condition of the sheep farmers, and for making available to the consumers within the country the finer wools produced in the area. Inducements are, however, necessary to these Sheep Breeders by way of better prices for superior grades of finer wools, but in the initial stages the quantity of such classed wools at these shearing yards is not adequate to attract big consumers to purchase it at good prices. This is indeed a vicious circle in as much as unless large quantities of finer class wools are produced big consumer will not be interested in finer wools at better prices and unless better prices are offered there is no inducement for the breeders to produce better wools. It is here that the Khadi and Village Industries Board can come to the rescue of these breeders by purchasing the graded wools at the community shearing centres, such time as ^{until} the quantities produced are of such magnitude as would induce big consumers to go in for these wools. It seems desirable, therefore, that the activities of the Khadi and Village Industries Board and the Cottage Industries Board should be co-ordinated with that of the community shearing programmes so that the above objective may be achieved.

Ram lamb rearing units :- The demand for mature rams for stud purposes not only within the State, but also from outside is a proposition that the State has not been able to tackle successfully on account of the magnitude of the demand compared with the shortage of mature rams. It is suggested that ram lambs may be selected and purchased from breeders soon after weaning and reared for another nine months on ram lamb rearing units as a possible solution to tackling this very important problem facing the sheep development programme generally in the country. The feasibility of attaching such lamb rearing units to the existing or to be established sheep and cattle farms may also be considered.

(4) Goat Development :- There are several breeds of goats in the State, some of them (Sirahi, Alwari, etc.) with good milk potentialities. It is suggested that Government breeding farms for some of these recognised breeds may be established early with a view to undertaking their conservation and improvement on scientific lines.

(5) Cattle Development :- There are nearly 8 distinctive breeds of cattle in the State. With a view to developing them a beginning has been made by establishing three Government Cattle farms, one for each breed in its home tract. It is necessary that cattle breeding farms should also be set up for the other breeds with a view to undertaking their development on scientific lines and the production of adequate numbers of pedigreed and progeny tested bulls for purposes of multiplication in the field.

It is gratifying that the State has a very ambitious programme of cattle development under private initiative and as many as 1,100 cattle breeding farms are proposed to be set up in the blocks at the rate of 10 farms in each block. The scheme appears to have received popular acceptance of the public as could be seen from the number of applications being received by the Department. When

the scheme is fully implemented, its contribution to the cattle wealth of the State would be substantial.

Cattle development in the blocks in and around large cities and towns:- In consideration of the growing demand for milk in the large cities and towns, maintenance of milk breeds of cattle is a felt need of the public, in these areas. It is recommended that in formulating schemes of cattle development in and around big cities and large towns, emphasis needs to be laid on the creation of pockets with such breeds of cattle as have potentialities for milk production, as for example Gir, Hariana, Rathore and such others.

6. Goshalas Development: There are at present 172 Goshalas in the State of which 100 have been affiliated to the Goshala Federation. 21 Goshalas have already been brought under the Goshala Development Scheme under the Second Five year Plan and the target for the next two years is said to be another 9 taking the total number of Goshalas, under the scheme, to 30. This scheme deserves all encouragement in view of the fact that a large number of these institutions are longstanding and have some fine types of animals with all the facilities for taking cattle breeding on scientific lines. *up

7. Poultry Development: The State has taken up an intensive programme of poultry development and has established 4 Government poultry farms and set up 10 extension centres, the latter under the Second Five Year Plan. The buildings for the Government poultry farms are under construction and the existing units are not in a position to rear all the chicks produced therein successfully owing to the limited brooding facilities. It is suggested that in order to make the maximum use of the hatching eggs and day old chicks at these farms, at least four battery brooders may be supplied to each of these farms. These battery brooders are obtainable in our country as they are being manufactured here. None of the extension centres visited is stocked with the number of birds required under the scheme owing to the dearth of foundation stock. The Ministry of Community Development has already taken up the question of securing at least a part of the requirements of Rajasthan State in regard to the foundation stocks from the Other States. It is suggested that in view of the possibility of securing day old chicks from other States and the limited brooder facilities on its own farms, a scheme for popularising the rearing of day old chicks by private breeders on the lines now in operation in Delhi State be formulated and implemented in the State.

The computation of mash feeds on Govt. poultry farms needs to be further examined for its protein content. It seems to be less than the optimum requirement while the fibre content is on the high side. Lessening of the wheat bran content and increasing the proportion of ground nut oil cake are indicated.

8. Piggery Development:- A beginning has been made by the State for popularising piggery development by starting a small pig breeding centre on one of its cattle farms with a view to multiplying the boars for distribution among the Harijans.

9. Fodder Development:- Increased attention to fodder development is imperative. It is observed that action has yet to be taken on the implementation of the fodder development scheme under the Key Village Scheme. In order to demonstrate and popularise the cultivation and usefulness of the various types of fodders, it is recommended that 2 to 3 acres may be earmarked for the purpose on each primary seed multiplication farm in the blocks and the fodder seeds, cuttings, slips, and roots from these centres be made available to the villagers in the blocks.

10. Disease Control:

(i) **Mobile vans:-** Vans are provided in some of the districts and are being used for undertaking prompt measures to effectively control the epidemics, investigation into the causes of obscure diseases and incidentally to supervise the work of the subordinate officers at frequent intervals. Similar facilities need to be

extended to other district offices where no such facilities exist at present.

(ii) Endemic Chart:- An Endemic Chart mapping the incidence of the common contagious diseases during each of the months in a year on the basis of their occurrence during the last 5 to 10 years should be prepared in respect of each disease for the area covered by a block or veterinary dispensary as per specification supplied. It serves the purpose of a ready reckoner which enables the occurrence of the disease being foreseen and preventive measures undertaken well in time.

(iii) Ambulatory Clinics:- In order to extend the benefits of veterinary aid to remote villages and to popularise modern methods of treatment among the farmers, ambulatory clinics need to be arranged in selected villages at periodical intervals. For this purpose, the Veterinary Assistant Surgeons, stockmen, and diploma holders of the contiguous area with the necessary equipment may camp in those villages for 3 or 4 days during which veterinary aid (both surgical and medical) may be rendered against all the ailments of livestock in and around the area.

(iv) Control of parasitic disease:- Helminthic diseases, especially Haemonchosis, Amphistemoniasis and Liver Fluke disease among sheep, goats and cattle are serious deterrents to livestock development in the State. Mass dosing of the livestock with drugs (Copper Sulphate, Phenolis, Carbon Tetra Chloride and Hexachlorethane etc) periodically is the only practical method available to us at present for minimising the damage caused by these diseases. As such periodical dosing require a large number of men which the Department is unable to provide with the limited technical personnel available in each block, it is desirable to train up village leaders in the technique of correct dosing of animals with these drugs and entrusting them with the task of undertaking periodical dosing under the supervision of the block extension officer or the stockmen.

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17. FISHERIES

FISHERIES

17. Fishery resources in Rajasthan are quite considerable. The State has more than 2,000 tanks with a range of 3 to 1,000 acres and produces about 15,000 maunds of fish. There are 400 minor irrigation bunds which annually flood and create thousands of acres of shallow water area. The lakes like Pervathi Sagar, Ram Sagar, Telshahi, Urmela Sagar, Bundbihar, Silesaid reservoir, Jaisamand lake, Hnssarover and Barothabund already support a natural fishery. In respect of fish seed, it is possible to develop the resources internally. Fisheries Development in the State should be mainly directed towards conservation, management, development and exploitation. Attempts so far made in respect of fisheries development are inadequate. However, the State has an ambitious programme of development from 1959-60 onwards. During this year, more than 4,99,000 lakhs of fish seed have been stocked in the NES and CD Blocks.

18. STAFFING

The various recommendations made at the Mount Abu Conference and the conference of State Ministers of Fisheries held at Mysore regarding staff and administration should be taken up for implementation in a phased manner.

2. The existing staff are not properly distributed. For example, in Bharatpur District, there is only one fisherman for the whole district with no superior officer to guide him, whereas in Jaipur, the Fisheries Development Officer and the Assistant Fisheries Development Officers are located in one and the same place. The Assistant Fisheries Development Officers from Jaipur and Ajmer may be transferred to Bharatpur and Kotah districts where prospects for fisheries development are favourable.

3. The field staff proposed during 1959-60 should be appointed as early as possible.

4. It was noticed that the fishermen so far recruited are not properly qualified, the reason ascribed being that the present salary scale of Rs. 25-1-40 is too low to attract suitable men. It is recommended that the salary scale of fishermen should be at least Rs. 35-2-55. Since the duties of the staff is watch and ward and enforcement of law. Their designation needs to be changed to fishery's guards or fishery watchmen.

19. TRAINING

The Fisheries Development Officer and Assistant Fisheries Development Officers are trained at the Central Inland Fisheries Research Station, Calcutta. In view of the intensive development programme that is chalked out for the coming years, it is recommended that the Fisheries Development Officer should be sent for training to Mysore State, Cuttack and Mettur Reservoir for refresher training in fisheries administration, conservation, management, cultural practices and reservoir development for a total period of one month.

2. Some of the local biology graduates should be selected for training at the Central Inland Fisheries Research Station, Calcutta.

3. Field training camps for V.L.Ws. and Panchayat Leaders should be conducted in each of the fishery divisions.

20. PROGRAMME

It is recommended that one or two blocks be taken up during 1959-60 for intensive development. The blocks of Maipura in Tonk District and Bassi in Jaipur District are recommended for intensive development.

2. There are many Fort Moats which hold perennial water supply. These may be suitably stocked and their resources properly developed.

3. There are many 'Dehars' which can also be brought under fish culture by suitable management of the waters.
4. Fish Seed Collection Centres should be established near each flood gate like Chilsana, Azanbund, Sikri etc.
5. Fish Farms need to be established near places like Silisaid and Jaisamand and similar reservoirs.
6. We recommend rehabilitation of a few refugee fishermen families in areas of reservoirs like Bundbaretha, Silisaid, Jaisamand, Mangolsa Dam and Udai Sagar.
7. The fishery rights in some of the natural lakes are auctioned on an annual basis. Under such leases, it will not be possible to enforce fishery conservation measures. It is recommended that the fisheries be leased out for a period of three years with suitable clauses for enforcing conservation measures and it is also recommended that one mile above the reservoir, i.e. in the streams entering the reservoir, and one mile below the reservoir be declared as fish sanctuaries.

In case of Bundbaretha reservoir, supervisory staff should be posted to prevent indiscriminate poaching and the stream area above Chinpura and Eeri may be declared as fish sanctuaries.

8. Fishery rights in smaller sheets of water should, as far as possible, be vested in Gram Panchayats. Fisheries development work needs to be co-ordinated between the Departments of Fisheries (Animal Husbandry), Forests and P.W.D. It will be desirable to set up a committee consisting of representatives of these Departments with the Fisheries Development Officer as the Secretary and Convener to formulate policies in respect of fisheries management.
9. Fishermen Co-operatives should be formed wherever possible and these should be entrusted with the management of fisheries in medium sized waters. In respect of big reservoirs the Department should undertake responsibility to formulate special schemes for each of these reservoirs and run them departmentally.
10. Mirror Carp is not introduced in the State in any significant measure. Attempts should be made to propagate them in suitable hill districts.
11. There are more than 8,000 acres of swamp water areas in the Ghana Forest sanctuaries. A beginning should be made to reclaim certain portions in this area for developing fisheries resources.

21. DELEGATION OF POWERS:

The Director of Animal Husbandry may be empowered to sanction fishery rights upto Rs. 15,000 and the Fisheries Development Officer likewise to sanction upto Rs. 5,000.

Powers of sanction to the Fisheries Development Officer need to be raised from Rs. 500 to Rs. 1,000. Imprint amount of the Fisheries Deptt. is only Rs. 75/-. This needs to be increased to at least Rs. 250 in the coming year.

22. FISHERIES ACT:

The State has enacted the Fisheries Act of 1953 and has framed rules under the same. The enforcement agency for these rules needs to be specified as early as possible.

23. FISHERIES RESEARCH STATION:

The State has just started a Research Station at Udaipur for conducting research work on problems of inland fisheries peculiar to the State. The question of appointing suitable staff and providing other facilities like an aquarium is said to be under the active consideration of the Deptt. The selection and appointment of a suitably qualified Officer, if necessary by direct recruitment, to the post of research Officer is important in order that this Institution may serve a useful purpose. As regards the aquarium, it is suggested that the plan drawn up for the purpose in Madras State may be looked into before the scheme is implemented.

MINOR IRRIGATION

24. ORGANISATION

The loan money under 'Minor Irrigation and Reclamation' is largely distributed to individuals for construction, and deepening of wells, installation of pumping sets etc. and only 'non-loan' money is used for small minor irrigation works generally costing less than Rs.20,000 each such as Bunds, Rapats etc. bigger works being financed from G.M.F. or Local Development funds. As the Block Development Officer has not been made Drawing and Disbursing Officer in this State, delays sometimes occur in actual distribution of loan money.

The recommendations of the Mount Abu Conference on minor irrigation were discussed between the officers of the Development and Irrigations Departments at a meeting of the Planning and Development Coordination Committee (Minor Irrigation) on the 15th July, 1958 and it was decided that Asstt. Engineers Irrigation would be responsible for the supervision of and execution of minor irrigation works undertaken out of block funds in their respective jurisdictions. In addition to this 8 posts of Asstt. Engineers have been sanctioned out of block budget but even where they are posted, the over all responsibility for execution of minor irrigation works is that of the regular Asstt. Engineer of that area. This arrangement appears to be working satisfactorily.

Some of the Asstt. Engineers appointed out of block funds are not borne on the regular cadre of any department either Building and Roads or Irrigation and they naturally feel uncertain of their future. It is desirable to bring them on the regular cadre of the P.W.D.

Overseers posted to the blocks are not eligible for appointment as Block Development Officers although many other Extension Officers are and this is causing a little discontent amongst them. The Rajasthan Government may consider treating them on par with other Extension Officers in this respect.

25. PROGRESS

Rajasthan State is to be congratulated on having incurred the highest percentage of target expenditure during the first 2½ years of the 2nd Five Year Plan period. The programme of repairs, extension and improvement of existing minor irrigation works and construction of new small irrigation works was discussed in detail between the officers of the Irrigation and Development Departments on the 14th August, 1958, when the need for surveying the irrigation potential in each block, as envisaged in the Mt. Abu Conference recommendations, was accepted and the Asstt. Engineers concerned were made responsible for the expeditious preparation of surveys and estimates. This is being done and has contributed substantially towards the good progress made in the execution of the minor irrigation programme.

According to the rules in force, only schemes which yield a return of atleast 2½% can be taken up against the Irrigation Department budget. The State, therefore, decided at the meeting of the 14th August, 1958 referred above, that in case of works where the return was expected to be less than 2½%, only such portion of the estimate as would ensure a return of 2½% should be charged to the Irrigation Department budget, and the balance should either be found through public contributions or out of the block budget.

The most popular type of minor irrigation works in the construction of bunds and rapats, water from which, though not directly used for irrigation, helps to raise in increased irrigation facilities. Irrigation from such wells

is said to have increased even more than 50% in many cases. No actual observations have been made of the spring levels of such wells before and after the construction of these bunds and rapats, and it is suggested that this may be done in all cases in future.

The need for conservation of water and its optimum utilization is comparatively greater in Rajasthan in view of the scanty rain fall and large hilly tracks. Very good work is already being done on 'Merh bandi' (and stone bunding in hilly tracks) as soil-cum-water conservation and land reclamation measures. Another important method of water conservation is proper alignment and section of field channels, and the cultivator needs to be educated in this respect also. It will be useful if demonstration plots set up by Agriculture Department are also utilised for construction model field channels. On the Chambal Project, the Irrigation Department staff is marking the alignment of field channels on Shajra sheets for facility of the cultivator and the Revenue staff. This practice should be adopted on small irrigation works in Blocks also.

26. PUBLIC PARTICIPATION

According to the present procedure for minor irrigation works taken up from block funds, 25% people's contribution on masonry work and 50% on earth work is required. It is understood, however, that people are not everywhere willing to contribute to this extent. For instance, in Dabi area of Bundi District, small irrigation works are being taken up out of the Minor Irrigation grant under Grow More Food for this reason and the work of construction of Deori Bund in Rajasand block originally taken up out of block funds, had to be transferred to the Irrigation Department's programme as requisite contribution from the people could not be obtained.

27. AGENCY FOR EXECUTION OF WORKS

Minor irrigation works financed from block funds are generally executed through Panchayats, Vikas Mandals, Cooperatives or other people's institutions which undertake to mobilise people's participation therein, and only in cases where no such agency is available, are contractors employed such as Bunda Anicut Scheme in Ladpura Block (in Kotah District).

28. MAINTENANCE OF MINOR IRRIGATION WORKS

It has been decided that all Minor irrigation works which irrigate less than 50 acres should be maintained by Panchayats, and those irrigating more than 50 acres be made the responsibility of the Irrigation Department. The Panchayats, however, do not have adequate financial resources to maintain the works satisfactorily and some B.D.C. and Panchayat members drew particular attention to this difficulty (Kokri and Jawaja Blocks). The State Government may consider placing adequate funds with the Panchayats for this purpose.

29. ADDITIONAL AREA IRRIGATED

Information regarding additional area expected to be irrigated or benefitted as a result of Block expenditure on Minor Irrigation and Reclamation has not been supplied in spite of reminders. This may be expedited.

30. COMMUNICATIONS

The programme is proceeding satisfactorily except that greater attention has been paid to mileage of roads than to providing an adequate number of drainage crossings.

In Masuda block of Ajmer District, a compensation of Rs. 1,000 had to be paid to the Forest Department out of block funds for a portion of forest land taken up by a road. This appears hardly justified when substantial contribution to the construction of these roads is made by the people.

31. CONSTRUCTION OF STAFF QUARTERS

The State is utilizing Rs. 80,000 for the construction of staff quarters in Stage I Blocks. In addition of part of the money for Rural Housing in Stage II Blocks is being utilized for this purpose and further some quarters for Extension Officers are being constructed from the P.W.D. funds.

The scale of accommodation has had to be drastically cut down owing to the increase in cost of construction particularly in big places such as Kotah and Jodhpur where only one room is now being provided for the Extension Officers. Two rooms are considered absolutely essential for the Extension Officers and it will be better to construct a smaller number of quarters than to provide one room per quarter.

No ventilators have been provided in the staff quarters at Kotah and in the block office at Hindoli. Stone or R.C.C. Jali ventilators can be put in fairly cheaply.

32. VILLAGE HOUSING PROJECT SCHEME

Here again Rajasthan's progress is about the best in the country and actual construction of houses has started in many villages.

In Govindgarh village in Pisangan Block of Ajmer District, it was noticed that houses were being constructed without any effort at widening very narrow streets in between. No development plan for the village appears to have been prepared in this case. In Rajmand Block of Udaipur District, progress has been slowed down owing to non-availability of funds for the disbursement of the last instalment of the loan.

It will be desirable to insist on construction of smokeless chullahs and sanitary latrines in houses constructed under this scheme.

33. ADMINISTRATION:

Health services both curative and preventive are administered by the Director of Medical & Health Services at the State level. In the districts the Principal Medical & Health Officer (Civil Surgeon) is responsible for both curative and preventive health services. He does not however possess any public health qualifications. To help him in his preventive work, he is assisted by an Assistant Health Officer (C.S. Class II) in the scale of Rs. 200-400. In the past some of these posts were held by licentiates with some experience or qualifications of public health. A number of posts of Assistant Health Officers are lying vacant. It is understood that the State Government have deputed doctors for the D.P.H. course in Calcutta. During Advisor (Health)'s last visit to Rajasthan in May, 1957, it was suggested that the posts of the Assistant Health Officers which are C.S. Class II in the scale Rs. 200-400 be upgraded to those of District Health Officers in a higher scale as it will be most difficult to secure an MBBS with DPH qualifications to serve in the scale of 200-400. Further this officer may be made responsible for all curative and preventive health services in the district, including maternity and child health services.

For effective development of the maternity and child health services in the rural areas, it is necessary that there should be a person at the district level who should tour the rural areas to supervise and give guidance in this work. For this purpose it would be necessary to have women doctors with MCH diploma or certificate in MCH attached to the district or at least one to each Division till more doctors become available. A recommendation to this effect was also made in my tour note of May, 1957.

The Principal Medical & Health Officer at the district level is an extremely busy person with his clinical work, private practice and looking after Govt. servants and their families and very little time is left to him for touring and giving adequate supervision and guidance. Majority of the basic services offered by the primary health centre are of preventive nature and it is essential that an officer qualified in preventive work be made responsible. It is suggested that a District Health Officer (MBBS, DPH) be made responsible; after all the District Health Officer is primarily a touring officer.

It is felt that time has come when the State Government should consider the question of having a single cadre of medical officers and those with specialist qualifications can be posted to different appointments as and when vacancies occur and be entitled to the pay and allowances as fixed for such appointments.

To be able to perform his duties satisfactorily, the medical officer posted to the rural area should preferably have about 2 years experience as an attached officer in a district or sub-divisional hospital. This would give him training in preparation of indents, maintenance of forms and records, submission of returns, etc.

34. STAFF & TRAINING:

In view of the reorganisation of the Community Development Programme, Rajasthan has to face the problem of establishing primary health centres and sub-centres in 59 Stage I blocks. In addition, 36 blocks will be allocated during the remaining period of the Plan. This would mean that the requirement of staff till the end of Second Plan will be of the order of

Doctors	95
Compounders	95
Sanitary Inspectors	95
Lady Health Visitors	95
Auxiliary Nurse-midwives:	$95 \times 4 = 380$

In addition, 87 blocks will be allocated during the first two years of the Third Plan. State Government may take these blocks also into consideration along with requirements of these personnel in local bodies, family planning work, etc. To the total thus arrived, it would be necessary to add 10% for wastage, sickness and leave reserve.

According to the figures of the staff available, it is noticed that there is shortage in all categories of the staff. It is understood that recently a number of doctors have been recruited in West Bengal for service in Rajasthan. This would make up a good deal of the existing shortage. Shortage with regard to compounders and sanitary inspectors can easily be made up by augmenting the existing training facilities in the State itself. The difficulties in connection with recruitment of health visitors and auxiliary nurse-midwives are presenting a problem for the Health Department, the main difficulty being that women with minimum basic educational qualifications, as laid down by the Examination Boards, are not available in Rajasthan. It is suggested that efforts should be made to recruit girls from other States like Madras and Kerala; in such cases it would be necessary to give these girls short training in Hindi at State expense, so that they can do their job more effectively.

35. RURAL HEALTH UNIT, BASSI (Jaipur).

This unit has been established in conjunction with the chair of Preventive and Social Medicine at the Medical College, Jaipur. It is recommended that full complement of staff as indicated by the Central Health Ministry should be recruited as early as possible, so that it can serve as a useful field for orientation of medical under-graduates, nurses and other health personnel. This unit can also be developed as a research centre in environmental sanitation on the lines of Research-cum-Action Centres at Najafgarh, Singur and Poonamallee.

36. PRIMARY HEALTH CENTRES:

High priority should be given for the construction of residential accommodation and building to house the primary health centres, particularly those earmarked to receive UNICEF aid.

*should
receive
special
attention.

37. CONTROL OF COMMUNICABLE DISEASES:

Recommendations as made in the Mount Abu Conference should be fully implemented.

It is further recommended that the State Government may consider the question of recruiting women and giving them training both as sanitary inspectors and vaccinators for employment preferably in the urban areas. Women workers have a great advantage over men workers in this field, because they can get an easy entry into the homes and can use extension technique with women in the homes for acceptance of control measures.

Vaccine Institute: State Government is dependent on outside agencies for supply of vaccine lymph and anti-cholera inoculation. It is recommended that State Government may consider the possibility of establishing vaccine institute at Mount Abu so as to be self-sufficient.

38. MODEL PUBLIC HEALTH ACT:

For efficient administration of Health Services, it is absolutely essential that a comprehensive Public Health Act be established in Rajasthan on the lines of the Model Public Health Act approved by the Central Government (Health Ministry) with any amendment to suit local conditions in the State.

39. ADVANCE PLANNING:

It has been found in the past that it takes a long time before primary health centres are established in the Community Development areas. To facilitate the establishment of primary health centres and the basic services associated with them, it is essential that planning should be carried out during the pre-extension period. This, at present, will apply to those blocks which are to be allocated from the 1st April, 1959 onwards. During the pre-extension period, the Development Commissioner should intimate the names of the blocks to the Director of Health Services, who, in turn should pass on this information to the respective District Medical/Health Officers (P.M. & H.O.). These officers should conduct a rough survey of the existing medical and health facilities in these blocks, if such a survey has not already been carried out. The survey should also indicate mortality and morbidity rates from various important communicable diseases. After all, effective planning can only be done on the basis of some knowledge of the existing health problems. In view of the fact that the State has already been delimited into blocks, it is felt that District Medical/Health Officers (P.M. & H.O.) should carry out such surveys block-wise of their respective areas and have all the information available at the district headquarters. The survey should indicate all the medical and health facilities whether operated by Government, District Board, or social organisations, like Social Welfare Board, Kasturba Trust, etc.

The District Medical/Health Officers (P.M. & H.O.) should discuss with the District Development Officers (Collectors) the suitability of an existing dispensary, if any, for upgrading it into the primary health centre and suitable sites for the establishment of sub-centres. Simultaneously, steps should be taken during the pre-extension period to obtain necessary sanction for the building, staff, equipment, drugs, etc., the intention being to establish health services immediately a block comes into existence.

It must be emphasized that the Development Commissioner is the coordinating authority only and the responsibility for the initiation and development of the health programme rests entirely with the State Health Department. The Civil Surgeon/District Health Officer/Principal Medical & Health Officer in whose area the block is situated is responsible for the overall supervision of the technical staff and the services rendered by the primary health centres. He will also give technical advice, when necessary.

40. LIAISON WITH BLOCK STAFF:

It has been observed that sufficient use is not being made of the Village Level Workers and Social Education Organisers in connection with the development of health programme. These categories of personnel are specially trained in environmental sanitation and prevention of communicable diseases and also in the extension technique to seek people's participation in this programme. The social education side has audio-visual aids also. It is recommended that the medical

and health staff working in the development blocks should have greater liaison with these field workers. The Social Education Organisers can be of very great use in the field of health education, if suitable instructions are given by the health authorities.

It may be stated that the Block Development Officer is as much a representative of the Health Department as of any other Development Department at the block level and as such, the D.H.S. and his representative at the district level can issue instructions to him for the planning and execution of health programme, if necessary.

41. LIAISON WITH SOCIAL WELFARE BOARD AND BHARAT SEWAK SAMAJ:

In blocks where these agencies are operating, it is recommended that close liaison be maintained for better coverage and to avoid overlapping.

42. COLLECTION OF VITAL AND HEALTH STATISTICS:

The most important factor for any health programme is to know the population and the rate of increase so that accurate advance planning can be carried out. Birth and death statistics should be collected according to sex, and arranged by age groups, 0-1, 1-5, 6-10, 11-15 and so on. Causes of deaths should also be known and this will give an idea about the prevalence of diseases which are responsible for high mortality or morbidity. It is suggested that these data be collected 'Block-wise' and figures should be available in the office of the Block Development Officer.

43. SCHOOL HEALTH:

Children of school-age represent an important segment of our population and yet no satisfactory arrangements exist for giving them adequate health care. Healthy or unhealthy habits and attitudes once acquired die hard; therefore, it is vital to inculcate healthy habits and attitudes from the very beginning. Such an opportunity is provided in the primary schools.

UNICEF assistance is being provided for improvement of environmental sanitation in some of the schools within easy distance of the P.H.C. UNICEF milk powder is also available for distribution. It is suggested that a comprehensive scheme be prepared to give adequate school health service including correction of defects and 'follow-up'. The scheme at this stage, with limited financial resources, will have to be limited to a small number of schools to begin with.

The role of the school teacher in this programme should not be overlooked. Parent Teachers Associations should be developed in areas where school health service is to operate. The subject of public health should be incorporated in the Teachers' Training Institutions, if it is not included already.

44. HEALTH EDUCATION:

No health programme can be developed effectively without people's participation. To obtain this participation people must be helped to realise and solve their health problems. This objective can be achieved through health education. Health publicity should form an integral part of the District Health Organization. It is recommended that some suitable officers be sent to the All-India Institute of Hygiene and Public Health, Calcutta, for training in health education. It has been noticed that effective use is not being made of the Social Education Organisers in the blocks in this respect. It is also not sufficiently realised that social education organizers are trained in seeking people's participation, and that the equipment like mobile

van projector, film strips, etc. is available with them. The additional material as devised by the Director of Health Services for Health Education Programme can be supplied to the Social Education Organizers. It must be realized that every worker in the field of community development is a potential educator. The officer-in-charge of the Health Education Programme at the district level should maintain a close liaison with the Social Education Organisers in the blocks.

45. FAMILY PLANNING:

State Family Planning Board has been formed and the family planning officer has been appointed.

Recently the Standing Committee of the All-India Family Planning Board has made a recommendation that funds for distribution of contraceptives should be made available to all P.H.Cs, rural dispensaries and sub-divisional hospitals. It is recommended that the State Government should take up their demand with the Central Health Ministry. The amount proposed is Rs. 1,000/- per year per clinic.

It is further recommended that family planning should be included in the syllabus in all the training institutions for doctors, nurses, health visitors and auxiliary nurse-midwives.

46. MALARIA ERADICATION PROGRAMME:

There are nearly 9 Hyper-endemic units working in the State. Out of these 24 units are operating in hilly areas. Seven additional units for hyper-endemic areas will be allocated in April next. There is a certain deficiency in various categories of the staff (doctors, malaria inspectors). It is recommended that immediate steps should be taken to fill up these gaps.

47. SURVEY AND TRAINING OF UNTRAINED DAIS:

To augment the training of local untrained women who are doing domiciliary midwifery, it is essential to have accurate data about the number of these women in the villages. It is recommended that the data be collected village-wise and made available at the block headquarters and the primary health centres. This will help the Health Department to plan the training programme. The assistance of the V.L.Ns and Gramsevikas can be taken in the collection of this data.

48. ENVIRONMENTAL SANITATION:

1. Rural Water Supply: This programme is executed by the Public Health Engineering Department, which is not under the Health Deptt.. For rural water supply there are several financial sources like community development, local development funds, National Water Supply and Sanitation, etc. It is recommended that funds should be pooled at the district level and comprehensive schemes put up, jointly by the Public Health Engineering and Health Departments.

The Government of India have started three months' course in public health engineering for executive engineers and overseers at the All-India Institute of Hygiene and Public Health, Calcutta. A stipend of Rs. 100/- and Rs. 75/- p.m. is given to the executive engineers and overseers respectively by the Central Health Ministry. It is recommended that the State Govt. should take full advantage of these courses.

2. Sanitary latrines and Urinals: A great deal has to be done to develop this programme. Actually our development programme will not be of very great value if health problems associated with pollution of soil continue to exist as they are at present. One of the reasons for the slow progress of this programme is that the VILs and SEOs do not get adequate training in this field in the training centres. It is recommended that sanitary latrines and urinals of the rural type be provided in all the training centres, so that the trainees can actually use these during the period of their training.

A large number of primary schools have been established in the community development areas and very few of them have been provided with sanitary latrines - in fact these amenities are omitted as a routine by the P.W.D. while putting up plans for schools in the rural areas. These amenities are essential to inculcate hygienic habits in the pupils and can also act as a 'method demonstration' to the villagers who have never seen a sanitary latrine. Further, improvement of health practices in the pupils can be utilized for motivating the parents.

It is recommended that the provision of sanitary latrines and urinals in the primary schools should be made a condition for receiving grant-in-aid.

WATER PROGRAMME

49. SUPERVISION & COORDINATION:

It is recommended that a woman Officer be appointed at the State level to coordinate the women and children's programme as soon as suitable person is available.

50. PROGRAMME:

Gram Kaddis: This institution of Gram Kaddis is welcomed by village people. It is good to see that so many camps both at Block and District levels are being held to give training to Gram Kaddis and that excursions and study-tours are also being arranged. It would be good if a few practical demonstrations such as for filling of compost pits, care of the baby, and simple house-hold remedies for the ordinary ailments of their children etc., are given to them.

ii) Extension workers, particularly Agriculture, Animal Husbandry, Cooperation should be associated with these camps so that they can give instructions and have discussions with Gram Kaddis.

iii) Non-officials, especially women M.L.As. members connected with Social welfare etc. should also be associated with these camps for Gram Kaddis.

iv) In addition to one camp of fairly long duration held only perhaps once in a year, camps of shorter duration to give refresher courses may be arranged.

51. EDUCATION OF GIRLS:

There seems to be very little awareness regarding the urgent need for girls' education. The present backwardness of education of girls is also due to lack of women teachers. There is a very small percentage of girls of school-going age enrolled in schools. A campaign may be organised to raise the consciousness of the people, especially the village women regarding this matter.

ii) Special condensed courses in some development activities may be arranged for village women in cooperation with the village Panchayats.

iii) Steps should be taken to start more primary and middle schools to enable more village girls to attend schools.

iv) Stipends should be offered to promising girls in village schools for further education, specially to enable them to be equipped for working as Gram Sevikas and other village workers.

52. Grassroots Cottage Industries:

i) Crafts and cottage industries that can easily bring in a little supplementary income should be encouraged such as Niver-making, Amber Charkha etc. Industries & Cooperation Officers should help to plan such economic programme for women as regards the kind of crafts to be chosen, marketing, etc.

ii) Assistance should be sought in the form of grants and loans as well as for training, from Khadi Commission, Industries & Handicrafts Boards etc.

53. PEOPLE'S ORGANISATION:

i) At least two women members should be co-opted on every Panchayat.

ii) They should be given training and instruction with regard to their role and responsibilities as Panchayat members.

iii) Every Panchayat should have a sub-committee consisting of men and women members to be responsible for Women & Children Programme.

iv) Panchayats should be associated more closely with all activities concerned with women and children, and they should be asked to find suitable places for Mahila Mandals; these Mahila Mandals may even be located in Panchayat Ghars or Community Centres.

v) There should be women members on every Block Development Committee.

54. FUNDS:

i) As there is a separate budget now for the Women's Programme, careful planning should be made for different items of the programme and the estimated cost for each item should be worked out by each block. The Development Department in consultation with women members of State Social Welfare Advisory Board may indicate the general lines along which this is to be done while each block should adapt it to their particular needs and resources available.

ii) Part of the loans given under the Rural Housing Scheme should be for providing accommodation for women workers and in some cases for Women's Centres.

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VILLAGE AND SMALL SCALE INDUSTRIES AND
INDUSTRIAL COOPERATIVES.

55. GENERAL:

The programme for development of Village and Small Scale Industries has been taken up in most of the blocks within the available resources. 480 training centres for training of rural artisans are at present in existence. About 1,900 artisans have been trained in different trades out of whom 1,380 persons have been given assistance to settle down in the trades. It is estimated that a sum of Rs.12.48 lakhs has so far been spent under the budget provisions of the Industries Department for implementation of schemes under the Second Five Year Plan in the blocks. In the two pilot projects 1,500 persons have been trained out of whom 1,150 persons have been assisted to take up the professions. Besides training, a good number of schemes on the production side/also been implemented in the pilot projects. The small Industrial Estate at Mukhapura is coming up. Training of women in crafts has also been receiving attention. About 1,200 sewing machines have been distributed to them in the block areas. The Industries programme is running fairly well. Some of the difficulties and problems which we feel should be taken up for consideration are stated below.

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56. ORGANISATIONAL SET UP:

The administrative set up of the Director of Industries at Headquarters has been strengthened. The district officers are in position. A phased programme for training of the D.I.Os has also been taken up. In some blocks the Social Welfare Department has been running independently some schemes for development of industries amongst the scheduled tribes and castes. It is recommended that blocks being the units of development the B.D.Os. should be empowered to implement all industries schemes for village and small scale industries in the blocks - and the Directorate of Industries should be the administrative agency for all such industries schemes at the State level.

57. STATE KHADI AND VILLAGE INDUSTRIES BOARD:

A State Statutory Khadi Board has been functioning in the State. The Board allots funds for implementation of schemes in the blocks on the recommendation of the Development Commissioner and also runs some village industries schemes through recognised non-official agencies. The State Board has its own field staff. As most of the village industries schemes are generally to be implemented through the Industrial Cooperatives, it is suggested that it would be more economical and convenient to utilize the Directorate of Industries as the agency for supervision and implementation of industries schemes through B.D.Os. in the Blocks. The Director of Industries may recommend detailed schemes to State Khadi Board for sanction of funds to the industrial cooperatives to be implemented under the

immediate.....

immediate supervision of the B.P.Os. As for the Amber Charkha and traditional Khadi spinning and weaving, these may, however, be implemented by the State Board and through recognised non-official agencies.

58. EXTENSION OFFICERS (INDUSTRIES):

There are 57 trained Extension Officers stationed and 63 are under-going training as against 122 blocks. The Extension Officers (Industries) in this State unlike other States are not given appointment before completion of their training of one year. They are, however, being given stipend at Rs.90/- per head per month during the period of training.

It is recommended that Extension Officers (Industries) may be appointed on probation on their sanctioned scale of pay at the beginning and given pay instead of stipends, as recommended in the Annual Plan discussions.

The programme for training of Extension Officers may be so phased that whenever a block is opened extension officers should be available for posting.

59. TRAINING CENTRES:

Quite a fair number of training centres is being run in the block areas under the budget provision for "Arts and Crafts", and the development programmes of the Industries Department. It was observed that emphasis has been laid on the training in leather tanning and handloom weaving as these are the important cottage industries in the blocks. It was reported that most of the trainees in the two pilot projects and a number of ex-trainees in other blocks have been given financial aid to settle down in the trades. Some cooperatives have also been organised amongst the ex-trainees. But it is observed that difficulty was being experienced for want of adequate funds in the matter of rehabilitating all the artisans on cooperative basis. The following points need consideration:-

- (a) Training in handloom for traditional weavers should generally be for a period of 3 to 4 months in place of 2 months. Training may also be given in weaving of Khadi, Ambar yarn to a limited number of weavers.
- (b) In some centres training in blacksmithy is for 6 months only. Training in blacksmithy should generally be for one year.
- (c) Regular supervision of the training centres by the extension officers need be stressed upon. Inspection books should be introduced in all the centres for the purpose.
- (d) Financial difficulty stands in the way of taking up a systematic follow up programme. Unutilized loan provision for housing in the block budgets could be made use of for giving loans to trained artisans.

60. PROGRAMME:

Revised minimum programme for Industries as recommended by the Mount Abu Conference has been under implementation.

Regarding the Khadi and Village Industries it has been reported that steps have been taken to utilize the funds allotted by the Khadi and Village Industries Commission for the year 1958-59 within the prescribed time limit.

It has, however, been observed that the Ambar Charkha programme as started in some blocks received a setback for want of servicing facilities. It is, therefore, suggested that the State Khadi Board may arrange training of an adequate number of mistries to provide servicing.

Khadi Bhandars need be opened to facilitate sale of Khadi and Village Industries products at least in the pilot projects. In U.P. Khadi Bhandars are running in the pilot project to popularise Khadi and Village industries products among the workers by barter system.

The Handloom Cooperatives as observed in some cases were not getting adequate working capital. The Central Banks are slow to disburse the loans placed at their disposal.

/Palmrosa oil The possibility of extracting/is being explored by the Industries Department in Sumerpur block. The National Research Laboratory at Hyderabad has made successful experiments for production of palmrosa oil on cottage basis. The laboratory may be contacted for technical assistance and guidance in this connection.

61. PILOT PROJECTS:

In the two pilot projects viz. Sanganer and Pisangan - a good number of training and production schemes have been implemented. About Rs.13 lakhs have been spent on production schemes. The follow up programme of the trainees has been taken up intensively. The State Government has also started another 3 pilot projects at its own initiative. The experiences of all these projects may be assessed for their application in the other block areas. The industrial potential survey reports of the two projects are also being examined by the Industries Department. Action taken for implementation of the recommendations may be intimated to the Ministry as early as possible.

62. FINANCIAL AID TO INDUSTRIES:

Under the State Rules for financial assistance to Industries - delegation of adequate powers to officers of the Industries Deptt. upto the Distt.level and the B.D.Os. are recommended in the Annual Plan discussions may be effected. The question of sanction of loans on personal bonds as per the recommendation of the small scale industries board may also be considered.

Regarding institutional financing of Industrial Cooperatives by the Central Cooperative Banks, the recommendations of the Working Group on Industrial Cooperatives may be considered.

TRIBAL WELFARE

63 DEVELOPMENT PROGRAMME IN MULTIPURPOSE TRIBAL BLOCKS

M.P.T.B. in the State: There is only one multipurpose tribal block allotted to the State. The Kushalgarh Block lies in Banswara District with a population of 28,008 of which 26,000 i.e. 90% are tribals (Bhills). The population is scattered over an area of 258 sq. miles in 210 villages. The majority of the villages are small, having 10 to 12 huts, separated from one another by small hills and ravines. In view of the problem of distance to be covered by each V.L.W. it is suggested that the possibility of providing more V.L.Ws than the existing 10 be considered.

64 Administrative set-up & the problem of coordination.

The Block functions directly under the supervision and guidance of the development Deptt. The collector, who is also the Distt. Development Officer, coordinates the programme at the Distt. Level.

The Social Welfare Deptt. which also looks after the tribal welfare programme in the State has one Director and 5 Asstt. Directors- one in each division. Under them work Social Welfare Officers and Supervisors. Two Research Asstts are attached to the tribal welfare section of the Deptt. It should be considered the responsibility of the Social Welfare Deptt. to give technical guidance to the development workers working both in multipurpose tribal block and other blocks having tribal population, in understanding the stage of development of the tribes and in solving the problems of tribal life. To fulfil this role, it is necessary to associate the Social Welfare Deptt. more actively with the work in the multipurpose tribal block and in other blocks having tribal population. Following measures may be considered in this connection:-

- i) To set up a small committee of the Dy. Development Commissioner, Director of Social Welfare and the Asstt. Commissioner for scheduled castes and tribes to coordinate and review the progress of the tribal welfare programme in the development blocks from time to time;
- ii) To associate the Asstt. Director of Social Welfare and the Asstt. Commissioner for Scheduled Castes and Tribes more closely with the Distt. and the Block Level Organisations of the multipurpose block;

In addition, it is necessary to equip the Social Welfare Deptt. with more technical personnel versed in tribal life and culture. It is understood that one of the Asstt. Directors of Social Welfare is proposed to be sent for training in tribal welfare to the Tata Institute Social Sciences. This is an encouraging move. Training facilities in tribal welfare need to be provided at all levels to the workers in the tribal areas. It is also necessary to strengthen the tribal research section of the Social Welfare Deptt. to offer technical assistance more effectively.

It was understood that the Social Welfare Deptt. concentrates most of its tribal welfare schemes outside the multipurpose block and hopes that the finances provided in the block may be adequate for the promotion of the welfare of the tribals in the block. Although this is a good approach, the Deptt. should exert its influence in developing suitable tribal welfare schemes in the multipurpose tribal block also. For example it should take more active interest in introducing the scheme of Ashram schools, hostels for tribal children, housing colonies etc. in the M.P.T.B.

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Absence of 'tribal touch' to the programme.

The programme developed in the Block is not based on understanding of all the tribal problems and the stage of development of the tribals. None of the workers seems to have insight into the tribal problems. None of them has any training in tribal life. The survey carried out in the early stage of the block was of a very general nature. The programme is developed on general lines like in any other development block. Under the circumstances, the purpose of providing the scheme of multipurpose tribal blocks with additional finances for intensive development of the area does not seem to be fulfilled. It is, therefore, suggested that the following steps be taken to provide a tribal touch to the programme:-

- a) to carry out a detailed survey of the tribal practices institutions and needs with the help of research workers of the Social Welfare Deptt. or any other suitable organisation.
- b) To modify the programme in the light of the findings of the survey;
- c) To give suitable training in tribal life and culture to all development workers working in the block. It would be easy to secure services of suitable personnel to train development staff in the block itself. In addition the S.E.O. trained in welfare at Ranchi S.E.O. T.C. may be placed in the block. It was observed that such S.E.Os. were working in other blocks whereas the M.P.T.B had SEO untrained in tribal welfare. The possibility of deputing the BDO for special training in tribal welfare to a suitable institute may also be considered.
- d) To associate voluntary organisations such as the Adan Jati Seva Sangh with the programme actively.
- e) To associate tribal representatives with the determination and organisation of the programme at every level.
- f) To relate the programme to existing institutions and practices of tribal life and gradually develop the programme at the pace of their receptivity and capacity.

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Staff.

The position of the staff has considerably improved except in the fields of public health and women's welfare. All workers except Asstt. BDO, Medical Officer, Sanitary Inspector, Lady Health Visitor, Mid-wives, one V.L.W., Woman SDO and two Gram Sevikas were in position. The total absence of medical and public health personnel and women workers requires immediate attention.

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Amenities provided to the Staff.

Most of the extension workers are provided with residential quarters. The V.L.Ws. are charged no rent. The H.Qr. of the Block provides educational facilities for children up to high school.

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Development Programme in M.P.T.B.

i) Agriculture and forest land: Out of the total of 1,62,916 acres, 69,377 acres are under forest, 58,880 under agriculture. The Block administration is trying to bring under cultivation 21,179 acres of cultivable land by allotting to the

tribals on the basis of 5 acres of irrigated land or 15 acres of dry land. This programme needs to be strengthened further. The agricultural land faces the problem of soil erosion. During the year a campaign for Mcd-Bandhi was carried out which resulted in covering 30% of the total cultivated area.

With regard to the forest land, it may be said that the process of afforestation seems to be progressing rapidly. This needs to be suitably checked without depriving the tribals of the advantage of forest economy. Efforts need to be made to correlate forest economy with tribal economy by giving forest rights to tribals for the sale of minor forest products to begin with. Some efforts are being made to form forest cooperatives of tribals for taking contracts in the forests. This effort is in very early stage. Concentrated efforts need to be made in this direction with the cooperation of the Forest Deptt. Forest-ranger working in the Block should be made a member of the development team. It was said that the members of the forest cooperative were not entitled to taccavi and other loans apart from those given by the Cooperative society. This discouraged the tribals from becoming members of the cooperative. This needs to be looked into at the earliest.

breed ii) Animal Husbandry. The condition of the cattle was very poor due to poor feed. An average cow was said to give half a seer of milk per day. The Block administration was trying to introduce improved breeds in the area, 12 Malvi bulls were supplied to the Panchayat for maintenance without remuneration. It was said that some bulls were not maintained properly in the absence of proper care by the Panchayat. This requires looking into. It was also said that the tribals were not able to utilise the scheme which exists on a minimum of 20 cows for private cattle farm due to their poor economic condition. The possibility of reducing the minimum number to 10 cows may be considered.

iii) Irrigation. Before the beginning of the block development programme, the block had 164 acres under irrigation. 100 more additional acres have been brought under into cultivation within six months. 241 irrigation wells have been constructed. In addition a number of causeways and culverts are being constructed. The programme of irrigation is very encouraging.

iv) Communications. The progress under communications is very poor. The Block in the absence of all-weather roads remains cut off from the Distt. for more than 4 months during the monsoon. The Asstt. Engineer attached to the block is in charge of the communications programme of the neighbouring 8 blocks. He is not able to do justice to his programme in the multipurpose block. There is need to provide one worker exclusively for the purpose. In addition it is necessary to pool all the available resources of the P.W.D., Irrigation Department and the Block Administration to work out a systematic programme.

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v) Housing. The block is making efforts to provide 279 houses to the tribals. 79 houses are completed. In spite of this progress, the scheme of providing housing requires looking into. It appears that the tribals were incurring debt to the extent of 300 rupees for housing in addition to the grant of Rs. 500 from the Government. Besides the purpose of the scheme did not appear to be clear in the minds of the block administration. The programme of education in changing living habits was conspicuous by its absence. The tribals have brought the new houses to insanitary conditions. The whole scheme requires re-consideration in terms of its objective and approach.

vi) Health & Sanitation: The programme was conspicuous by its absence. In the absence of medical staff no programme was possible. There is not a single public health centre in the block, where health services are required urgently. The absence of health programme has also affected the programme of removal of superstitions and witchcrafts, prevalent among the tribals.

vii) Education. The block has 26 primary schools with 947 on the rolls. This provides educational facilities to the extent of 27% of children. The coverage of the girls is only 2%. The employment of Grant Sathini has increased enrolment of girls from 7 to 65. There is no basic school in the block. During the recent enrolment drive undertaken by the Block workers the enrolment increased by more than 100%. But due to lack of follow up it has again gone down by 50%.

There is not a single Ashram school in the block.

The whole programme of education requires further promotion.

viii) Social Education: The programme follows the usual stereotyped approach to literacy classes, reading rooms and libraries. S.E.O did not seem to have any insight in to the tribal culture and practices. He has not taken care even to train the adult teachers in their work. The cultural programme did not seem to emphasise the folk life of the tribals. The youth programme lacked economic emphasis. The programme of social education needs reorientation.

ix) Cottage industries. There was no scheme of training or production in practice in the block. It was however said that two schemes of soap making and leather work were sanctioned and the technical staff was being recruited. The industrial Extension Officer needs to know more of the economics of these two industries to help tribals to take advantage of the schemes. It was further said that three more schemes of carpentry, bamboo work and tile work were being contemplated. This block was finding it difficult to get trained instructors. This requires looking into. It is also necessary to provide hostel facilities with adequate stipends to tribal youths for utilising the training facilities.

x) Women's Programme. The women's programme is not developed in the absence of women workers. Even in the place of woman SEO a man is provided. This is an undesirable practice. The absence of women workers was most noticable in the housing programme where tribal women needed guidance in adopting new practices in living. The whole programme requires immediate attention.

69. Panchayats:

There were only 6 Panchayats in the Block. Due to the widely distributed population in small hamlets, difficulties were experienced in forming Panchayats. Nearly 25 to 48 villages form one panchayat. The Block Development Committee has recommended 11 panchayats in place of 6. The possibility of lessening the minimum population coverage of Panchayat may be considered sympathetically.

70. Indebtedness of the tribals.

It was felt that in spite of the development programme, the prevailing indebtedness among the tribals has not lessened. There is need to provide Co-operation credit facilities to the tribals to overcome the need to incur private debts. A systematic programme of abolition of all previous debts through legislation and to assist tribals in promotion of economic welfare needs to be worked out.

71. The Problem of peoples contribution.

The Abu Conference recommendation No.9(h) to exempt tribals from the provision of peoples contribution even of 25% is not implemented in the area. It is necessary to adopt the recommendation of the Abu Conference, and waive as and when necessary the requirement of 25% peoples participation for the promotion of the programme in the area.

72. Finances:

From the provision of Rs 27 lakhs the block has spent Rs. 7,50,477 up to December, 1958, that is during the period of 1½ years. The major expenditure has been on construction of Head Quarters buildings irrigation and rural housing. It is necessary to develop intensively the programme of economic development, education and communications. It is suggested that during the third year of the development programme an assessment may be made as to the extent of effective utilization of the financial resources provided in the scheme, and the findings reported to the C.D. Ministry.

73. Programme of tribal welfare in other development blocks.

There is considerable population of tribals scattered in development blocks in some districts of the State. The Social Welfare Department spent considerable amounts in providing various schemes of welfare for these tribals. There is no system of coordination of activities of the Social Welfare Department with the programme of development department in these blocks. The problem of tribals to be integrated with the rest of the population of the block is unique in itself. It requires understanding both on the part of the tribals as well as the non-tribals. It is necessary to establish close cooperation between the work of both the departments in the Development blocks having tribal population. The possibility of channelising the schemes of tribal welfare through the block administration may be considered.

74. ADMINISTRATION.

i) Integration of the post of S.E.O.

Social Education organiser is partially integrated in the Education Department. Although his post is still in the Development Department, his appointment and transfers are made by the Dy. Director (Social Education) in consultation with the Development Department. His salaries are on par with the sub-inspector of schools (Rs. 110-225 with Rs. 25/- special pay). His technical work is supervised by the Distt. Social Education Organiser working in Education Department. He is associated with the general supervision of primary schools alongwith the S.D.I. It was reported that the possibility of integrating his post in the cadre of the Education Department is under consideration.

There are no education and social education sub-committees of the Block Development Committee or of the Village Panchayat. In view of the emphasis on closer association of people in the planning and organisation of the programme, it is necessary to constitute such sub-committees at the Block and the Panchayat levels for more effective promotion of education and social education programmes in the villages.

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ii) Supervision & Technical guidance: The directorate of education has appointed Dy. Director of Social Education to administer the social education programme both in the block and non-block areas. His Head Quarter is situated in the same place as that of the Development Department. He acts as liaison between the Education Department and the Development Department. He is assisted by an Assistant Director of Social Education and 14 Distt. Social Education Organisers—one for two districts on average. The Dy. Director recently attended the officers orientation course at Mysore. 7 of 14 District Social Education Organisers have undergone training in social education at the Central Institute of fundamental education. 3 more are being sent for training. The remaining will be given the necessary training in due course. From the talks with some of the District Social Education Organisers it appears that some of the Block Development Officers were utilising the services of Social Education Organisers as their personal assistants rather than for the promotion of social education programme. If this is true, it requires looking into. In addition, clearly stated job-chart of the Social Education Organiser needs to be circulated among the Block Development Officers, to clarify their understanding of his role. A joint circular from the Education and Development Department needs to be sent to Block Development Officers in this connection. Recently, the syllabus committee for the job training of Social Education Organisers appointed by the Community Development Ministry has re-stated the duties of Social Education Organisers with greater emphasis on the role of community organisations in promoting social education programme in the villages. This may be made use of. / Director of Social Education has already taken steps in cooperation with the Development Department, to make the supervision of the District Social Education Organiser more effective and to stop the misuse of the services of Social Education Organisers. It is suggested that a seminar of Block Development Officers may be held to discuss ways and means of utilising the services of Social Education Organisers more effectively.

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75. SOCIAL EDUCATION UNDER THE DIRECTORATE OF EDUCATION.

In addition to the budgetary provision for social education programme under development, the Directorate has spent nearly Rs. 10 lakhs for social education out of its own

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own budget. The programme covers the activities of audio-visual aid, libraries and reading rooms and social education centres in non-block areas. In connection with the activities of audio-visual aid, facilities of an auditorium, film library of 800 films, 4 mobile vans and a well-equipped workshop for the repairs of generators, film machines and radios are provided at Ajmer. As yet the Directorate has not succeeded in establishing a central library. There are, however, 5 regional, 24 district, 7 Tehsil, 80 village libraries and 4 mobile libraries. In addition 61 private libraries are provided with grant in aid. The programme of social education in non-block areas is limited to 60 social education centres.

The Dy. Director of social education is in charge of this programme and utilises the resources of the Education Department adequately.

76. SOCIAL EDUCATION ORGANISER AS A MEMBER OF THE DEVELOPMENT TEAM.

The Social Education Organiser enjoys equal position with the other extension officers. In fact he is being given Rs. 25/- as special pay on par with agricultural extension officer and some of the other extension workers.

77. TRAINING OF THE SOCIAL EDUCATION ORGANISER.

Out of 170 male Social Education Organisers employed both in the posts of man and woman Social Education Organisers, 119 are trained and 51 untrained. Efforts are being made to depute the remaining Social Education Organisers to Social Education Organiser Training Centre. In addition, there is need for organising refresher course for Social Education Organisers in position for more than 4 years. Services of Social Education Organiser Training Centre may be effectively utilised in promoting the training of Social Education Organisers both formal and inservice.

78. CONTRIBUTION OF THE FIELD WORKERS INCLUDING THE SCHOOL TEACHERS AND THE LOCAL WORKERS.

The services of school teachers and educated villagers are increasingly utilised in organising social education programmes in the villages. In the blocks visited, it was observed that the Social Education Organisers have not realised the importance of giving training to these workers in the method of working with adults and of organising social education activities. This needs to be immediately attended to.

The State has a peripatetic orientation training team for the teachers. In this programme also, the courses and methods in organising social education activities for villagers need to be introduced. Similarly the S.T.C. Basic Institutes need to have a course in organising social education activities

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79. PROGRAMME OF SOCIAL EDUCATION AT THE BLOCK LEVEL

i) LITERACY WORK:- Although efforts are being made to organise adult education classes in the blocks, it appears that much of the energy spent is lost without proper training of the adult teachers and a properly worked out follow up programme. The SEO does not seem to consider his primary duty to survey the illiterate population of the villages and plan the programme accordingly. The enrolment to these classes is also done without any planning. The reading rooms and libraries are not used as centres of post literacy work. It is suggested that the following steps be taken to make the programme more effective:-

- a) Systematic survey of literate and illiterate population be carried out in each village.
- b) The enrolment of the members to literacy classes be done on definite lines- giving priority to those youths who had dropped out from schools due to economic reasons;
- c) Relating the literacy programme to youth programme and craft programme;
- d) Maintaining systematic follow up of the adult male literates with the education programme of library, reading room and other activities.

ii) READING ROOM & LIBRARIES: This programme also seems to be developed unevenly. Besides, maintaining coordination between the literacy work and reading rooms and libraries, it is necessary to introduce the scheme of systematic feeding of the village libraries by the Block Tehsil and District Libraries. The services of mobile libraries may be utilised for this purpose. SEO should be guided to utilise libraries as centres of discussion classes and interest groups.

iii) AUDIO VISUAL AID:- The programme of audio visual aid is not systematically organised in the blocks. Some blocks having projectors get films from various departments on their own. Block with no projectors depend on the services of mobile vans. It is necessary to pool all the available resources of various departments and distribute them evenly among the blocks. There is also need for the coordination of the programme for the distribution of films at the Distt. level. Audio visual Section of the Directorate has an excellent workshop at Ajmer for repairs of generators, film machines and radios. Services of this workshop should be used more effectively by the Development Department for repairs of their equipments. It was also suggested that the technical personnel of the workshop may be deputed to all the blocks to check the equipments and help in maintaining it in good order.

iv) CULTURAL PROGRAMME:- The traditional folk life of Rajasthan offers an excellent source for promoting cultural programme in the villages. In some of the villages visited, the local artists have succeeded in introducing the development scheme in traditional rhythm. It is necessary to make some financial provision for the encouragement of folk songs at the block level.

80. MINIMUM & MAXIMUM PROGRAMME :

During the visit to various blocks, it was observed that the Block administration has adopted the minimum programme prescribed at the Mussoorie Conference more or less in a stereotyped manner. It needs to be noted that the programme so recommended only indicated the broad lines. Each block should determine its own minimum programme according to the prevailing standard of the literate and illiterate adults. It is also necessary for the SBO to associate actively in determining the percentage of school going age children not attending schools and associate actively in their enrolment to Schools. The minimum programme should reflect the prevailing needs of each village separately.

The emphasis in the programme should not be on physical targets but should be on the quality of the work

81. USE OF VILLAGE GROUPS AND COMMUNITY ORGANISATIONS IN DEVELOPMENT OF SOCIAL EDUCATION PROGRAMME

1) PANCHAYAT: Although Panchayat is associated in securing cooperation in works programme as yet the Panchayats have not taken active responsibility of running social education activities. It is suggested that the supervision of the social education centres in villages be entrusted to the Panchayat and wherever possible Panchayat be encouraged to pay a part of the expenses for running these activities.

ii) YOUTH ORGANISATIONS: Considerable number of youth activities were noticed in the blocks visited. The emphasis has been mainly on the organisation of recreational, cultural and social service activities. It is also necessary to give new orientation to this programme on the basis of economic approaches. In addition the youth be entrusted with various responsibilities for organising literacy camps, sanitation camps, social services programme in the villages under the guidance of the Panchayat.

iii) COMMUNITY CENTRES: A large number of Community Centres were formed to provide recreation and cultural programmes. In some of the centres, radio sets are provided. It is necessary to develop these centres as Multipurpose centres of cultural, social and economic activities with the help of village leaders.

82. V.L.W. PRIZE COMPETITION: The competition is being finalized at the State level. The result will be communicated in a few days.

EDUCATION.

83. RECOMMENDATIONS OF MOUNT ABU CONFERENCE:

The recommendations of the Conference were considered by the Director of Education and comments sent to the State Govt. Some of the recommendations are being implemented. Enrolment drive was introduced in July last which resulted in increase of 14% in the case of boys and 4% for girls. The scheme of appointing Gram Sathins in the village schools has helped considerably in enrolling more girl students. The Directorate is finding it difficult to secure more women teachers in the absence of available educated women willing to go to rural areas. The State has no mid-day meals programme due to limited budgetary provision. The common syllabus has already been introduced both in basic and non-basic schools.

84. ADMINISTRATIVE SET UP:

The education directorate consists of the Dr. of Public Instruction, Addl. Dr., Jt. Director, 5 Dy. Directors, one in charge of each division, 1 Dy. Director for Social Education, 1 Dy. Director for basic education, 3 Asstt. Directors, 18 Inspectors of schools, 8 Dy. Inspectors, 14 Distt. S.E.Os. and 163 Sub-Deputy Inspectors of schools. The Director of Public instruction looks after general administration, college education and planning. The Additional Director is in charge of primary and secondary education. He has the power of a head of a Department. The post of Jt. Director is vacant. The Dy. Directors of Education at the divisional level are in overall charge of all educational programmes.

85. JURISDICTION OF THE S.D.I.

The jurisdiction of the S.D.I. is not yet coterminous with the block. In some of the blocks, visited the schools were inspected by two or three S.D.Is. The total number of schools ranged from 40 to 90 per S.D.I. in different district.

There are at present 163 S.D.Is. in position. This includes 17 S.D.Is. employed under the Ministry of Education's scheme of employment of educated unemployed. Additional S.D.Is. are to be appointed under the same scheme during the coming year. Thus there will be 182 posts as against 232 blocks into which the State is delimited. Thus there is a shortage of 50 S.D.Is. About 50 S.D.Is. are required for urban areas. It is hoped that the State will take necessary steps to appoint increasing number of S.D.Is. to achieve the goal of making the jurisdiction coterminous with the block as far as possible. This is also necessary in view of the recent scheme of coordination between the work of the S.D.I. and S.E.O. introduced by the State.

86. ENROLMENT OF CHILDREN IN SCHOOLS:

The State has only 22.3% of children of the age of 6 to 11 attending schools (31.3% of boys and 8.4% of girls). This average is very low as compared with the all India average of 53%. There are historical reasons for this low enrolment. The Directorate is

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making every effort to overcome this lag. The State has introduced the scheme of employing school mothers (Gram Sathins) in primary schools to enrol more girl students. This has helped considerably in increasing their enrolment. Much however, remains to be done.

87. In some of the blocks visited the development workers along with the education workers have introduced enrolment drives in the villages. In many cases, the drive has resulted in considerable increase of numbers in the schools - in some to the extent of 100%. But due to lack of follow up the increased enrolment has fallen down by nearly 50%. The achievements obtained during the drive need to be maintained systematically by the teachers of the schools. Although there is need for more schools in some of the villages, it was observed that the enrolment was not adequate as compared to the number of teachers employed. The average of 40:1 student teacher ratio was not maintained. In the whole of the State the ratio was 1:20 before the drive and 1:30 after the drive. Even then there is scope for the increase of 10 pupils for every teacher employed. This requires immediate attention.

In addition the teachers were not willing to stay in the villages. They did not consider the maintenance of up-to-date records for school going age children and the follow up of the children not attending the school as their functions.

Following steps may be considered for the increase of enrolment in the village schools:-

- i) Maintenance of systematic record of school going age children in the village;
- ii) Cooperation of V.L.W. and S.T.O. for securing more and regular attendance of children in schools;
- iii) Employment of more Gram Sathins and utilising their services for securing attendance both of boys and girls;
- iv) Utilising services of the Gram Kaki in enrolling children in school.
- v) Encouraging the members of the Mahimandal to carry out campaigns in the villages for more enrolment of boys and girls.
- vi) Associating actively the Panchayat with the promotion of education in the village through education and social education sub-committee.

88. BUDGETARY PROVISION:

The provision made in the block budget for education is utilised effectively in providing educational facilities in the block with the concurrence of the Education Deptt. Uptil 1958, the block administration was utilising its budgetary provision on its own. In 1958 both the Departments of Education and Development had conferences to straighten out the programme. It is now left to the Education Deptt. to open new schools. The SDI of the area works closely with the block team. His tour programme in the block is prepared in consultation with the B.D.O.

89. TRAINING PERSONNEL:

The Directorate has adopted an integrated approach to the training of primary school teachers. All the teachers' training institutes have adopted Basic training course. The percentage of trained teachers is however only 36.4. Much

remains to be done. The directorate is proposing to introduce two to three months of short courses for training teachers with many years of experience. The training programme should also include a general course in Community Development and a specific course in methods of social education.

90. BASIC EDUCATION:

The Education Directorate has adopted a systematic programme for converting gradually all primary schools into basic schools. All new schools of one teacher are made basic oriented i.e. the teaching is related to the activity. When the second teacher is provided the school is converted into basic school. Thus every year 500 schools are converted into basic schools and all new schools are basic oriented schools. In addition, another 1,000 schools have been provided with crafts as a stage towards basic teaching. It is hoped that by September, 1959 all the traditional schools will become basic oriented.

The programme is very laudable and deserves appreciation.

91. Pilot Projects in universal education:

The State has not introduced any pilot project of universal education for the study of the problems of universal enrolment. Only the Ajmer experiment introduced earlier is carried further. This requires looking into. It is suggested that the State may adopt a selected number of such projects with the assistance from the Ministry of Education.

92. Orientation training:

The State has introduced orientation course in Community Development for village teachers. One peripatetic team is functioning since April, 1957. Up till now 205 teachers have been oriented in Community Development programme. Nearly 25% of these teachers were Head Masters. The course is conducted efficiently. The problem is more of follow up. It is not known as to how many teachers so trained have taken to village work or related school to village life. It is necessary to assess the results of training. There is need for providing advance financial facilities to Block Development Officers where the Training Centres is located, for making necessary arrangements. The SDI needs to be closely associated with the programme. The workers of the peripatetic team seemed to feel fatigue of continuous work. This needs to be looked into.

93. Vigyan Mandirs:

There are two Vigyan Mandirs functioning in the State. One of them visited was adequately staffed with trained workers. The museum was well developed and they library well equipped. The problem is more of communication of scientific ideas to the villagers and helping them to form an attitude of reasoning. Only 200 persons were provided scientific assistance during the period of two years. It is necessary to form hobby groups and interest groups among the villagers, to propagate scientific knowledge.

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ACHIEVEMENTS OF RAJASTHAN

94. A statement indicating the progress of work in Rajasthan upto the 30th of September, 1958 in relation to all-India achievements is attached (Annexure-a). It will be seen therefrom that the progress in the following fields is good:-

1. Improved seeds distributed.
2. No. of compost pits dug.
3. Improved animals supplied.
4. Animals castrated.
5. Smokeless chullahs constructed
6. Adult literacy centres functioning
7. Adults made literate.
8. Reading rooms opened
9. No. of members and No. of meetings of Youth/Farmer's Clubs
10. No. of Mahila Samitis, their members and meetings.
11. No. of village leaders camps held and villagers trained
12. Katcha roads constructed.
13. Government expenditure
14. Peoples contributions

The following items however need attention.

1. Chemical fertilisers distributed
2. Agricultural demonstrations held
3. Areas under green manures
4. Improved birds supplied
5. Rural latrines in use.
6. Drains constructed
7. No. of Block Development Committee meetings held.

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Progress of work in Rajasthan in relation to All-India
upto the 30th September, 1958.

Items	Total all Series achieve- ments in West Bengal	All India perspective all Series	% $2/3 \times 100$
(1)	(2)	(3)	(4)
<u>Agriculture</u>			
1. Improved seeds distributed (Mds.)	8,13,087	7,62,854	107
2. Chemical fertilizers distributed (Mds.)	2,92,513	18,85,115	16
3. Improved implements supplied (No.)	45,055	56,738	79
4. Agricultural demonstrations held (No.)	79,612	2,34,245	34
5. Area under green manures (acres)	69,823	2,00,395	35
6. Compost pits dug (No.)	3,35,165	2,42,164	138
<u>Animal Husbandry</u>			
7. Improved animals supplied (No.)	2,285	2,202	105
8. Improved birds supplied (No.)	12,72	50,277	43
9. Animals castrated (No.)	2,41,297	2,06,721	117
10. Animals treated (No.)	27,90,620	14,50,668	19
<u>Rural Health and Sanitation</u>			
11. Rural latrines in use (No.)	6,672	24,482	29
12. Drains constructed (yds.)	1,63,422	8,08,891	19
13. Smokeless chullahs constructed (No.)	9,978	9,551	105
14. Village lanes paved (sq.yds.)	2,01,633	4,08,034	50
15. Drinking water wells constructed (No.)	6,200	3,229	96
16. Drinking water wells renovated (No.)	6,349	9,416	64
<u>Social Education</u>			
17. Adult literacy centres functioning (No.)	5,098	4,201	119
18. Adults made literate (No.)	1,35,337	1,43,319	115
19. Reading rooms opened (No.)	3,132	2,178	147
20. Community centres functioning (No.)	3,939	4,974	86
21. Youth/Farmers' club			
i) No.	3,411	4,090	83
ii) No. of members	44,954	45,149	100
iii) No. of meetings	13,719	13,317	103
22. Mahila Samities			
i) No.	1,284	922	141
ii) No. of members	16,134	14,438	111
iii) No. of meetings	10,577	5,094	206
23. No. of camps held	1,038	993	105
24. No. of villagers trained	50,761	48,964	104
<u>Communications</u>			
25. Kacha roads constructed (miles)	4,572	3,795	121
26. Existing kacha roads improved (miles)	3,770	4,414	86
27. Culverts constructed (No.)	1,650	2,468	69
<u>General</u>			
28. Block Development Committees meeting held (No.)	1,100	1,190	24
29. Government expenditure (Rs.'000)	64,077	49,920	128
30. People's contribution in cash, kind and lakhs (Rs.'000)	51,788	31,860	163

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MINISTRY OF COMMUNITY DEVELOPMENT & COOPERATION

Summary record of the discussion between the Officers of Rajasthan Government and the Ministry of Community Development and Cooperation held at the Secretariat, Jaipur, on the 20th January, 1959.

INTRODUCTION:

At the outset Shri B.R. Tandan, ICS., Secretary, Ministry of Community Development and Cooperation, thanked the Development Commissioner, the Deputy Development Commissioner and all the other Officers who had accompanied the team during the visit to the blocks. He then explained the genesis of the new practice of visiting the States as a team. It was tried as an experiment in Madras State in February last and was commended by the Chief Secretary, Madras, as a valuable method. One of the main advantages of such a team visit is that it helps strengthening the coordinated approach at the State level and gives an opportunity to have a look at the programme in all its different facets at one and the same time. Discussions with the heads of technical departments across the table remove the feeling that the community development programme is of the Development Department only and not their own programme.

A G R I C U L T U R E

(Paras 3-10)

3. SOIL CONSERVATION AND MEDH BUNDHI:

(i) It was agreed that soil conservation with limited technical staff would be taken up in one district and the subsidy will be so fixed that the funds available do not restrict the area to be contour bunded. In the remaining districts medh bundhi will be taken up on a wide scale.

(ii) It was agreed that follow-up dry farming and line sowing measures should be introduced simultaneously with the soil conservation measures and medh bundhi.

4. LOCAL MANURAL RESOURCES:

(i) It was agreed that intensive measures should be taken for increasing the production of organic manures in unirrigated areas particularly by adopting peripheral sowing of pulses, strip cropping with pulses, plantation of shrubs like Karenj and Glyricidia, and better conservation of cowdung and animal urine.

(ii) Each district must have its own recommendations for building up the fertility of the soil, which will be taken up as the principal task. Assistance of Gram Kakis and others will be secured for compost and other work for building up soil fertility.

5. FERTILIZERS AND MANURES:

The scope for utilizing fertilizers in small quantities in unirrigated areas will be demonstrated by laying out demonstrations on unirrigated rain-fed crops.

6. SEED MULTIPLICATION:

The area under improved seeds will be determined on the basis of crop cutting experiments carried out in those blocks where the work has been going on for atleast 3 to 4 years.

8. AGRICULTURAL IMPLEMENTS:

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It was agreed that after the demonstration stage is the sets of implements would be supplied to the Panchayats, blacksmiths and others for being issued on hire to individual farmers.

9. PROGRAMME PLANNING:

It was agreed that during Panchayat Seminars and training camps emphasis should be laid on self-improvement and self-help in the field of Agriculture. The Gram Sevaks and the Panchayats should be closely linked up with the preparation of village agricultural plans.

10. SUPERVISION:

At least one thorough inspection note should be written in a year for each block in the district by the District Agricultural Officer. Similar notes may also be prescribed for the Deputy Directors.

A N I M A L H U S B A N D R Y

(Paras 11-16)

12. STAFF:

It was stated that the proposal for appointing one more Deputy Director for the fourth division was already under the consideration of Government and the question of appointing a Deputy Director for the fifth division would be taken up at a later stage.

13. TRAINING:

(a) Stockmen: A school for training stockmen is being established in Jodhpur and it was stated that it would start functioning soon.

(b) V.L.Ws' TRAINING CENTRES: As regards providing demonstration facilities in dairying, poultry keeping and sheep farming in each of the five V.L.Ws Training Centres in the State, it was felt that in view of the State being demarcated into two zones with emphasis on agriculture in one, and on Animal Husbandry in the other, the training centres located in these zones should provide such facilities for practical training in either of these fields in accordance with its importance to the zone. This would help relieve the strain which would be entailed on the trainees in the event of equal stress being

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laid on Agriculture and Animal Husbandry regardless of its importance in the zone.

(c) Orientation Training: Arrangements are being made to provide orientation training to workers in the Animal Husbandry field in the Veterinary College at Bikaner to which a block has also been recently attached for providing facilities for training in extension technique.

The suggestions made in the note regarding the deputation of trainers of these trainees to various institutions and States, was agreed to. Regarding the training of the District Officers in extension technique, it was stated that facilities are being provided for this purpose at Udaipur where the necessary training to the District Officers would be possible.

14. SUPERVISION:

Agreed to.

15. DELEGATION OF POWERS:

Agreed to.

16. PROGRAMME:

(1) Artificial Insemination: The establishment of the Semen Banks as recommended by the Mount Abu Conference and the deputation of selected Officers for training in the Regional Centre at Cuttack and some of its sub-centres and also the deputation of some officers to Himachal Pradesh and Jammu & Kashmir for training in the technique of Artificial Insemination in sheep were accepted.

(2) Veterinary Dispensaries: It was stated that while the need for more veterinary institutions in the State was undeniable, it was not possible for the State to make as much headway in this programme as was desirable because of the limited provision in the budget. The programme had, therefore, to be necessarily kept within the plan provision and as many dispensaries as possible would be established during the plan period.

(3) Sheep Breeding: The recommendation relating to the need for co-ordination between the Cottage Industries Board, the Khadi and Village Industries Board and the Community Shearing Sheds established in the blocks was agreed to, and it was stated that the matter would be referred to the concerned authorities.

Regarding the establishment of ram lamb rearing units, it was felt that the 1,100 private sheep breeding farms that the State was sponsoring would be in a position to produce and rear to maturity an adequate number of ram lambs and when all these farms are established during the course of the current plan period, a sufficiently large number of stud rams would be available not only for catering to the need of the State, but also to meet the demands of the other States. It was suggested that the indenting States would be well advised to seek the

help of the States Animal Husbandry Department in order to obtain quality stock at reasonable price.

(4) Goat Development: The question of establishing Government Goat Breeding Farms was said to be already engaging the attention of the Department and proposals in this regard were being submitted to the State Government.

(5) Cattle Development: The recommendation regarding the setting up of pockets of milch breeds of cattle in the blocks round the towns and large cities was accepted.

(6) Goshalas Development: Agreed to.

(7) Poultry Development: The suggestion regarding the supply of battery brooders to each of the existing poultry farms was accepted.

(8) Piggery Development: Recorded.

(9) Fodder Development: It was stated that while the suggestion regarding the setting up of fodder cultivation demonstration plots in each of the primary seed multiplication farms in the blocks would be examined, the fodder development scheme undertaken by the Ministry of Food and Agriculture in the desert areas of the State under soil conservation projects had not made much headway so far and that it would be necessary to take such measures as would intensify the programme, as it would automatically improve the fodder position especially in the arid region of the State.

(10) Disease Control.

(i) Mobile Vans: It was revealed that mobile vans were available in 13 districts already and before the end of the plan period 12 more districts will be provided with vans.

(ii) Endemic Chart: Agreed to.

(iii) Ambulatory Clinics: Agreed to.

(iv) Control of parasitic diseases: The suggestion made regarding the training of village leaders for undertaking periodical mass dosing of livestock against parasitic diseases was accepted, and it was stated that arrangements would be made to impart the proposed training in the Village Leaders Training Centres.

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18. STAFFING:

In respect of shifting the staff, it was explained that at present the staff are busy with stocking programme in Ajmer and Jaipur Districts. Soon after this is completed, they would be shifted to Bharatpur and Kotah Districts as recommended in the note.

(3) Agreed to.

(4) It was felt that change of designation was of minor importance. However, the recommendation would be considered.

19. TRAINING:

It was agreed to send the Officers for refresher training to the States suggested in the note. The Director of Animal Husbandry would approach the Director of Fisheries of the above States in respect of facilities for refresher training.

The paucity of trained personnel to run the schemes was brought up during the discussion. It was suggested that the Ministry of Community Development would assist the State Government in obtaining the services of trained personnel if an approach is made to them.

20. PROGRAMME:

(1) to (6) Agreed to.

(7) The question of revising the system of auctioning fishery rights was generally agreed to and since it was a policy matter, the Director of Animal Husbandry, Rajasthan, was requested to submit proposals to the State Government early.

(8) to (11) Agreed to.

21. DELEGATION OF POWERS:

It was agreed to examine the proposals.

MINOR IRRIGATION

24. ORGANISATION:

It was agreed that the B.D.Os should be the Drawing and Disbursing Officers.

The Development Commissioner stated that only one Asstt. Engineer paid out of Block funds was not on the regular cadre of the P.W.D and even he would shortly be brought on to the P.W.D cadre.

The Development Commissioner agreed to consider the suggestion of making the Overseers eligible for appointment as Block Development Officers.

25. PROGRESS:

The suggestion of observing the spring levels of wells in the vicinity before and after the construction of the rapats was accepted.

The suggestions in regard to proper alignment and construction of field channels were also accepted. The Development Commissioner stated that it was intended to take this up in five villages in each block, but much headway had not been made so far.

27. AGENCY FOR EXECUTION OF WORKS:

No comments.

28. MAINTENANCE OF MINOR IRRIGATION WORKS:

The Development Commissioner stated that a sum of Rs.5 lakhs had been allocated for carrying out the necessary repairs to small irrigation works before handing them over to Panchayats and that the Panchayats should thereafter be able to maintain these works out of the revenue obtained by way of water charges (i.e. Re. 1/- per acre) together with the people's contribution, as according to the Chief Engineer Irrigation, the normal cost of maintenance of these works was about Rs. 2/8 per acre.

29. ADDITIONAL AREA IRRIGATED:

The Development Commissioner said that information in respect of additional areas irrigated/benefited had so far been collected blockwise irrespective of the sources of expenditure i.e. G.M.F or block funds, and that it had not been so far possible to compute separate figures. It would take some time.

31. CONSTRUCTION OF STAFF QUARTERS:

The Development Commissioner stated that only in 5 Blocks had the accommodation in the Extension Officers' quarters been cut down to one room each, but even in these cases, orders had been issued to add another room.

32. VILLAGE HOUSING PROJECT SCHEME:

The suggestion for construction of Smokeless Chullahs in the houses, taken up under the Village Housing Project Scheme, was accepted. In regard to the construction of sanitary latrine however, the Development Commissioner was of the view that the villagers just would not use them and it would be useless expenditure.

H E A L T H

33. ADMINISTRATION:

The suggestion for upgrading the post of Assistant Health Officer to that of District Health Officer and making him responsible for all curative and preventive health services in the District would be considered by the State Government. There is difficulty of obtaining Lady health workers. Steps to recruit some of them from outside the State are being taken.

The question of constituting a single cadre of Medical Officers would be considered by the State Government.

34. STAFF & TRAINING:

Steps are being taken to recruit medical personnel from outside the State.

35. PRIMARY HEALTH UNIT, BASSI:

The suggestion was accepted.

36. PRIMARY HEALTH CENTRES:

Priority is being given for construction of quarters for medical personnel.

37. CONTROL OF COMMUNICABLE DISEASES:

Very few women are available for employment as

Sanitary Inspectors and Vaccinators. However, steps will be taken to recruit more women for this work. The question of starting a Vaccine Institute at Mount Abu is under consideration.

38. MODEL PUBLIC HEALTH ACT:

A new Public Health Act is being drafted.

39. ADVANCE PLANNING:

40. LIAISON WITH BLOCK STAFF:

41. LIAISON WITH SOCIAL WELFARE BOARD AND BHARAT SEVAK SAMAJ:

The recommendations were accepted.

42. COLLECTION OF VITAL & HEALTH STATISTICS:

43. SCHOOL HEALTH:

A pilot project for School Health Service has already been started in the State with the aid given by UNICEF. Expenditure on it is also met from the Children's Health Fund, because the staff is not taken up in Government service, there are difficulties of getting adequate personnel.

44. HEALTH EDUCATION:

The suggestions made will be examined by the State Government.

45. FAMILY PLANNING:

To a query by the Development Commissioner, it was explained that Family Planning is successful in other States. Rajasthan is utilizing the financial assistance given by the Health Ministry for the purpose.

The suggestion to include Family Planning in the syllabus of the training institutions for medical personnel was accepted.

46. MALARIA ERADICATION PROGRAMME:

Steps to recruit the full complement of staff required will be taken.

47. SURVEY AND TRAINING OF UNTRAINED DAIS:

The suggestions were accepted. There are 8 Centres already functioning for training of Dais.

48. ENVIRONMENTAL SANITATION:

Funds for rural water supply available from all sources are already being pooled together at the block level. The suggestion to send Executive Engineers and Overseers for training in Public Health Engineering was accepted.

The recommendation to have sanitary latrines and urinals in all training centres and primary schools was accepted.

WOMEN'S PROGRAMME

49. SUPERVISION & COORDINATION:

The State Government agreed to appoint a woman officer at the State level to supervise and coordinate women & children's programme in the whole State as soon as a suitable person is available.

50. PROGRAMME:

i) It was agreed to have a few practical demonstration such as in filling up compost pits, care of baby etc. in the Gram Kakis' Camps.

ii) The suggestion that different Extension Officers, especially the Compost Inspector should be asked to give demonstrations and talks relating to their programmes, was accepted.

iii) It was agreed to associate non-officials especially women M.L.As and Social Workers with these camps.

51. EDUCATION OF GIRLS:

i) The State Government is encouraging education of girls. It was agreed that more concerted efforts may be made such as a campaign to rouse the consciousness of the village people, particularly the women.

ii) The State Government is already considering the question of condensed courses of education for village women. Measures suggested regarding encouraging more girls to attend schools, stipends for future village workers etc. were already being adopted.

52. CRAFTS & INDUSTRIES:

i) The suggestion that Industries Officers and Cooperatives Officers should help plan crafts and industries programme for women, was accepted.

ii) It was agreed that the help of Khadi and Handicraft Boards etc. should be sought for this programme.

53. PEOPLE'S ORGANISATIONS:

i) The recommendation regarding women members on Panchayats, was accepted.

ii) The suggestion that women members of Panchayats should be given some training regarding their roles and responsibilities was also accepted.

iii) The recommendation regarding sub-committees of Panchayats to be responsible for women & children's programme was accepted.

iv) The suggestion that Panchayats should be associated more closely with the women & children's programmes was accepted.

v) It was agreed to implement the recommendation that there should be more women members on B.D.Cs.

54. FUNDS:

i) The suggestion regarding a plan for the budget for women's programme was accepted.

ii) The recommendation regarding accommodation to be provided for women workers and for women's centres under Rural Housing Scheme, was accepted.

VILLAGE AND SMALL SCALE INDUSTRIES & INDUSTRIAL COOPERATIVES

55. GENERAL

The progress during the last one year in the field of cottage and small scale industries has been very appreciable and a good beginning has been made.

56 & 57. ORGANISATIONAL SET UP & STATE KHADI & VILLAGE INDUSTRIES BOARD

It was emphasised that in view of the fact that Extension Officers (Industries) are trained by the Khadi Commission for 8 months in their Mahavidyalayas and for 4 months in the Small Industries Service Institutes and also in the programmes of various other Boards, they should be utilised for implementation of all schemes of village and small scale industries in the blocks. The recommendations in paragraphs 56 & 57 will be examined by the State Government, in order to ensure that a coordinated approach is made in the matter of implementation of schemes and to avoid creating parallel agencies at all levels. The Development Commissioner, however, cautioned that in view of the fact that there are a number of agencies at the State level these are bound to be reflected on a block level. But he agreed to examine the question in consultation with State Boards and others concerned. (Action: Development Commissioner, Rajasthan)

58. EXTENSION OFFICERS (INDUSTRIES)

The recommendations were accepted in principle and these will be further examined. (Action: Development Commissioner, Rajasthan)

59. TRAINING CENTRES

The recommendations were agreed to. (Action: Director of Industries, Rajasthan)

60. PROGRAMME

The recommendations were agreed to. (Action: Director of Industries, Rajasthan)

As regards the items relating to State Khadi and Village Industries Board these will be taken up with the State Board.

In this connection it was pointed out that it is desirable if a representative of the State Khadi and Village Industries Board attends such meetings which review the progress of village and small scale industries in community development blocks since the State Board is responsible for the implementation of khadi and village industries programme in the blocks. (Action: Development Commissioner, Rajasthan)

61. PILOT PROJECTS

The recommendations were accepted. (Action: Director of Industries, Rajasthan)

62. FINANCIAL AID TO INDUSTRIES

The recommendation were accepted. (Action: Industries Department, Rajasthan)

It was further emphasised that the State Cooperative Department should take necessary steps to emphasise the importance of industrial cooperative societies being financed by the State Central Cooperative Banks. In this connection the paucity of funds with the Central Cooperative Banks was mentioned and it was stated that unless the Reserve Bank of India takes up the programme for making available necessary funds, as in the case of handloom cooperative societies, for financing village and small scale industries, it will be difficult to extend institutional financing to industrial cooperative societies on a large scale. The Ministry of Community Development was requested to take up the matter

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with the Ministry of Commerce and Industry and the Reserve Bank of India. It was felt this matter may be discussed by the Central Coordination Committee. (Action: Ministry of Community Development, New Delhi.)

TRIBAL WELFARE
(Paras 63 - 73)

63. DEVELOPMENT PROGRAMME IN MULTIPURPOSE TRIBAL BLOCKS

It was felt that there was no need to have additional V.L.Ws. in view of the population of the block being 28,000.

64. ADMINISTRATIVE SET-UP AND THE PROBLEM OF COORDINATION

It was agreed to consider the suggestions given with regard to the association of Social Welfare Department more actively with the work of the multi-purpose tribal block.

It was stated that the Social Welfare Department has one Assistant Director already trained in Tribal Welfare; another is sent for training. It was agreed to consider the possibility of providing further training to the workers in the tribal areas and to strengthen the research section of the Welfare department.

65. ABSENCE OF TRIBAL TOUCH TO THE PROGRAMME

It was stated that the tribals residing in Rajasthan are not in the stage of primitive life. The process of acculturation has gone on for a long time and some of the tribals have become good agriculturists. It was, however, agreed to consider various suggestions regarding detailed survey, training of workers and relating the programme to the existing social institutions and the stage of development of the tribals.

66. STAFF

It was agreed to explore further possibility of securing medical and public health personnel and women workers for the block.

67. DEVELOPMENT PROGRAMME IN MULTI-PURPOSE TRIBAL BLOCKS

(i) Agriculture and forest land: The State had already appointed a special committee to suggest ways and means of relating the forest economy to tribal welfare. The recommendations of the committee are awaited. It was agreed to find out whether the members of the forest Cooperatives were not entitled to taccavi and other loans in the Block.

(ii) Animal Husbandry: It was agreed to consider the possibility of reducing the minimum number of cows to 10 for the scheme of private cattle farm.

(iii) Communications: It was agreed to consider the work load of the Assistant Engineer stationed in this block and attached to other blocks and see how the programme of communication can be effectively developed with the cooperation of other allied departments.

(iv) Housing: It was agreed to study the scheme of housing in relation to tribal welfare and make the necessary adjustments. It was further agreed to introduce the programme of education in changing living habits of people residing in the newly constructed houses in the villages.

(v) Health & Sanitation: It was agreed to give priority to this block for appointing a medical and health personnel.

(vi) Education: It was agreed to strengthen the programme of education in the block. It was further agreed to establish at least one Ashram school in the block during the coming year.

(vii) Social Education: It was agreed to appoint a S.E.O.

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trained at Social Education Organisers' Training Centre, at Ranchi to this block with instructions to re-adjust the programme of social education to tribal culture.

(viii) Cottage Industries: It was agreed to secure the services of trained instructors for introducing various schemes of cottage industries in the block.

(ix) Women's Programme: It was agreed to give priority to this programme atleast a few of the Gram-kakkis in the block at the earliest.

69. PANCHAYATS:

It was agreed to consider the possibility of lessening the population coverage under the Panchayat Act to enable the Multi-purpose Tribal Blocks to have more Panchayats.

70. INDEBTEDNESS OF THE TRIBALS:

It was acknowledged that steps required to be taken both in the direction of helping the tribals to settle their debts and also in improving their economic conditions so that they need not incur further debts.

71. THE PROBLEM OF PEOPLES CONTRIBUTION

It was agreed to accept the recommendations of Abu Conference and to consider the possibility of exempting the tribals from 25% of people's contribution for work programmes as and when required.

72. FINANCES

It was stated that the total provision made in the scheme of Multi-purpose Tribal Blocks can be utilised during the period of 5 years.

73. PROGRAMME OF TRIBAL WELFARE IN OTHER DEVELOPMENT BLOCKS

It was agreed to establish greater co-ordination between the working of the Social Welfare Department and the Block administration in promoting schemes of tribal welfare in mixed areas.

SOCIAL EDUCATION

(Paras 74 - 82)

74. ADMINISTRATION

(i) It was stated that the S.E.O. has been completely integrated in the Education Department. It was agreed to form education and Social Education sub-committees at the block and the panchayat levels.

(ii) It was agreed to clarify further the job of the S.E.O. and to instruct the B.D.O. to utilise his services accordingly. It was also agreed to have a seminar of the B.D.Os. in this connection.

77. TRAINING OF THE SOCIAL EDUCATION ORGANISER

It was stated that the programme of refresher's course for S.E.O. has already been planned and implemented.

78. CONTRIBUTION OF THE FIELD WORKERS INCLUDING THE SCHOOL TEACHERS AND THE LOCAL WORKERS

It was agreed to instruct the S.E.O. to organise training of the teachers and village workers in methods of adult education.

79. PROGRAMME OF SOCIAL EDUCATION AT THE BLOCK LEVEL

It was agreed to consider the various suggestions given for promoting literacy work, reading rooms and libraries and audio-visual aids. It was,

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however, pointed out that the State has adopted a 12 point programme of Community Development and given greater concentration to a selected number of items in the programme of social education. It was further stated that the provision for financial assistance in connection with cultural programme has already been made.

81. USE OF VILLAGE GROUPS AND COMMUNITY ORGANISATIONS IN DEVELOPMENT OF SOCIAL EDUCATION PROGRAMME

1) Panchayats: It was agreed to associate the panchayats more closely with the organisation of the Social Education programme in the villages.

2) Youth Organisations: It was agreed to give greater emphasis to economic programme of Youth Organisations.

3) Community Centres: It was agreed to develop community centres as multi-purpose centre of cultural, social and economic activities with the help of village leaders.

82. V.L.W. PRIZE COMPETITION

The State has agreed to communicate the result of the competition within a few days.

EDUCATION (Paras 83 - 93)

83. RECOMMENDATIONS OF MOUNT ABU CONFERENCE

It was stated that the possibility of supplying mid-day meals was considered in details and it was resolved to postpone the implementation of the scheme due to financial paucity.

84. ADMINISTRATIVE SET UP:

There are 23 Inspectors of Schools and 5 Deputy Inspectors of Schools in charge of big and small districts respectively.

85. JURISDICTION OF THE S.D.I.

The State has decided to make the jurisdiction of the SDI coterminous with the block in CD Blocks (Stage II) to begin with and with the gradual increase in the number of the SDIs the programme will be further extended.

87. It was agreed to increase the enrolment in the schools so as to have the teacher pupil ratio of 1:40. It was further agreed to consider the various suggestions given to increase the enrolment.

89. TRAINED PERSONNEL

It was agreed to give greater emphasis to the training programme.

90. BASIC EDUCATION

The effort of the State was noted with appreciation.

91. PILOT PROJECTS IN UNIVERSAL EDUCATION

It was agreed to look into the possibility of introducing pilot projects for Universal education in selected number of blocks.

ACTION POINTS

I - AGRICULTURE

1. Orders to be issued by the State Government for planning the next medh bundhi campaign and for including the dry farming measures as a part of this campaign.
2. The State Department of Agriculture may attend to the following :-
 - (a) Prepare a list of recommendations for each district for building up the fertility of both irrigated and unirrigated lands.
 - (b) Prescribe the number, type and particulars of demonstrations to be laid down for building up the fertility with the help of locally produced materials.
 - (c) Prescribe the number and type of demonstrations of fertilizers to be carried out on unirrigated and rain fed crops and in areas of low rain fall.
 - (d) Start crop-cutting experiments in selected old blocks for determining the area under improved seeds.
 - (e) Prescribe the inspection notes to be written and thorough inspections to be carried out periodically for the District Agricultural Officers and Deputy Directors of Agriculture, and fix the responsibilities for ensuring the implementation of this recommendation.

3. Action to be taken by the Development Department:-

- (a) Secure from the Department of Agriculture a schematic programme for expenditure of Rs 50,000 provided under Agriculture and ask the B.D.Os to spend the money on the lines of the schematic programme in consultation with the Deputy Director or the D.A.O.
- (b) To arrange for the issue of improved implements on hire to individual farmers through Gram Panchayats.
- (c) To arrange for adequate marketing facilities in the towns for fruits, vegetables, eggs, milk etc. produced from the blocks surrounding the towns and cities.

II - ANIMAL HUSBANDRY:

1. Provision of practical training in dairying, poultry keeping and sheep rearing to the V.L.Ws in their training centres should be confined to the zone where the emphasis is on animal husbandry.
2. For giving orientation training to Animal Husbandry extension Officers, suitable officers of the Department who are to serve as trainers to the trainees to be deputed to various institutions outside the State.
3. Deputation of selected officers for training in the Regional Centre at Cuttack and deputation of some officers to Himachal Pradesh and Srinagar for training in the technique of A.I. in sheep.

4. Provision of battery brooders to each of the existing poultry farms in the State.
5. earmarking a small area on the primary seed multiplication farms in the blocks for demonstrating the cultivation of fodder crops and for serving as a source of fodder seed seedlings and cuttings to the block area. The work relating to the fodder development scheme formulated by the Ministry of Food & Agriculture, Government of India under the soil conservation measures in the desert areas of the State needs to be speeded up.
6. Training of village leaders in dozing cattle and sheep against parasitic diseases and utilizing their services for periodical mass dozing of livestock.

III - FISHERIES:

1. Shifting of the staff from Ajmer and Jaipur to Bharatpur and Kotah Districts where prospects for fisheries development are favourable.
2. Deputation of F.D.O. for refresher training to Mysore, Mettur and Cuttack.
3. Revision in the system of auctioning fishery rights.

IV - MINOR IRRIGATION:

1. B.D.Os. to be made Drawing & disbursing Officers.
2. Overseers should be made eligible for appointment as B.D.Os.
3. Cultivators should be educated in proper alignment and construction of field channels, and optimum utilization of available water resources.
4. Figures of additional area expected to be irrigated or benefited as a result of block expenditure on minor irrigation and reclamation should be compiled as early as possible.

V - COMMUNICATIONS:

Greater attention should be paid to the providing of sufficient drainage crossings on roads taken up under the block programme.

VI - RURAL HOUSING:

Smokeless chullahs should be insisted upon in houses taken up under this scheme.

VII - HEALTH:

1. Steps to constitute a single cadre of medical officers should be taken.
2. Training centres and primary schools should be provided with sanitary latrines.

VIII - WOMEN'S PROGRAMME:

1. Appointment of a woman officer at the State level to supervise and coordinate women & children's programme.
2. Steps should be taken to give better training to Gram kakis.

3. More emphasis should be given on girls' education.

4. Appointment of women members on Panchayats and B.D.Cs.

IX - VILLAGE & SMALL SCALE INDUSTRIES AND INDUSTRIAL COOPERATIVES:

Action as in paragraphs 56 to 62 of the Summary Record.

X - TRIBAL WELFARE:

1. The State to provide further training facilities to the workers in tribal areas and strengthen the research section of the welfare department strengthened.
2. To consider the suggestions of detailed survey, training of workers and relating the programme to the existing social institutions and the stage of development of the tribals.
3. To provide tribal touch to the programme.
3. To give priority in appointing medical and public health personnel.
4. To reduce the minimum number of cows for the scheme of private cattle farm.
5. To make the work of assistant engineers more effective in promoting communications and to correlate all the resources for the programme.
6. To make the necessary adjustment in the housing scheme for the tribals.
7. To give priority to appoint women workers.
8. To establish an Ashram school in the block.
9. To appoint a SEO trained in the SEOTC at Ranchi.
10. To secure services of trained instructor for cottage industries programme.
11. To appoint gram kakis in the block.
12. To reduce the minimum population coverage under the Panchayat Act to provide more panchayats in the block.
13. To work out a detailed scheme for removing indebtedness among the tribals.
14. To implement the ABU recommendation in relation to the tribals' contribution to works programme.
15. To coordinate more effectively the work of the Social Welfare Department and Block Administration in mixed areas.

XI - SOCIAL EDUCATION:

1. The State to form education and social education sub-committees at the block and Panchayat levels.
2. To clarify further the job of the SEO to BDO and to organise a seminar of the BDOs in this connection.
3. To instruct SEO to organise training of the teachers and village workers in methods of adult education.

4. To associate closely the panchayat with the organisation of social education programme.
5. To emphasise economic programme of Youth organisations

XII-PRIZE COMPETITION:

The State to communicate the results of the competition at the earliest.

XIII-EDUCATION:

1. The State to increase the enrolment of schools so as to reach the pupil teacher ratio of 40 : 1 in the schools.
2. To consider various suggestions given for the increase of enrolment.
3. To give greater emphasis to the programme training of teachers.
4. To introduce pilot projects of Universal education in selected number of blocks.

Feb 24/1957

A BRIEF NOTE ON UNDERTAKINGS AND ACHIEVEMENTS OF THE
DESERT AFFORESTATION & SOIL CONSERVATION
STATION, JODHPUR

....

The Station, initially called as Desert Afforestation Research Station, was established in 1952 to deal with increasingly felt problems of Rajasthan Desert. The activities of the Station began with a four point programme of creation of oasis wherever possible; establishment of a 400 miles long and 5 miles wide belt of trees along the frontier; creation of shelterbelts and demonstration of afforestation of different kinds of desert lands. On the recommendation of Dr. A.Y. Goor, F.A.O. Expert, the Station was reorganised in January 1957 shifting the emphasis from the erstwhile demonstrational aspect to increased research activities.

ACTIVITIES PRIOR TO RE-ORGANISATION:

In connection with the creation of oasis, a total of 11 nurseries were established by the end of 1956 in various parts of western Rajasthan from which more than 2,000,000 seedlings were produced for afforestation purposes, and utilised by the Station and the public bodies. In addition, seed of desert hardy trees and grasses, to the extent of 200,000 lbs. were distributed to over 300 private and public agencies.

On the border, an area of 35 square miles was taken over for afforestation purposes in 1955 of which 800 acres were fenced for experimental afforestation. In view of the failure of repeated trials of tree species but of excellent regeneration of grass and shrub species by mere protection, which could serve the same purpose of checking sand blowing across these parts, original object of creating a tree belt has been abandoned in favour of grassland development in the border area.

In respect of shelterbelts, 82 miles roadside plantations were completed along the main roads distributed in different parts of Rajasthan.

For demonstrating afforestation activities, 433 acres in rocky areas of Nailana, 480 acres in semi-rocky land in Beriganga, 220 acres of consolidated sandy soils in Narhar and 695 acres of shifting sand dunes in Jhunjhunu, Sardarshahar and Churu were successfully planted to various tree species. In addition, 8000' long Railway track at Palana and Sikar were treated successfully to

demonstrate the utility of biological control for checking up of the Railway track being covered by sand during windy months.

Afforestation of consolidated loamy soils at Pali indicated that these lands could be best developed for forage purposes.

POST -RE-ORGANISATION ACTIVITIES:-

With the increased emphasis on research since reorganisation in 1957, the demonstrational activities, which figured prominently earlier, are now being limited. The additional demonstrational activities after reorganisation included establishment of 5 more nurseries, 59 miles of roadside plantations, afforestation of 675 acres of rocky and semi-rocky area at Kailana and Beriganga and sand dune fixation of 505 acres. In addition, about 8000 acres have been taken up for Pasture Development. The distribution of seed and seedlings was continued.

The research activities of the Station is being organised under three sections viz., Agrostology, Agronomy and Silviculture. An experimental Farm of 163.23 acres has been developed for this purpose.

The Agrostological Researches aim at obtaining information on improvement and management of natural and sown grasslands consistent with the demands of soil, animal and man. Important investigations on hand are carrying capacity studies on sown and native grasslands, agronomic investigations on promising grasses including fertility building aspect, palatability studies, reseeding trials of grasses and ecological studies. The section also maintains about 40 acres grass-seed multiplication block at Pali and Jodhpur.

The Agronomic Researches aim at finding out various soil and water conservation measures for crop farming in the arid regions. Investigations on hand include crop introduction, cultural, manurial and rotational requirements of crop plants, studies on special farming systems like wind strip cropping and stubble mulch farming.

The Research investigations under Silvicultural section include studies on adaptability of indigenous and exotic species, comparative merits of different nursery techniques, relative usefulness of various afforestation techniques, water and nutritional requirements of tree species and techniques for sand dune fixation.

In order to demonstrate to the stock-owners, the philosophy that well managed grassland means good and healthy animals and consequently profitable returns in terms of money, a Grassland Improvement scheme is being worked under the Station. To-date 77 sites have been selected in 28 N.E.S. Blocks, actual working having been undertaken on 33 sites.

The Station also has an I.C.A.R. Grassland Survey scheme working under it in its final year.

EXTENSION ACTIVITIES:

Special emphasis has all along been given to the extension side and all possible avenues are being utilized for awaking public interest in desert problems and the remedial activities of the Station. The means include active participation in local exhibitions and fares, Farmers' Days, showing Station Films, radio talks, lectures and through press.

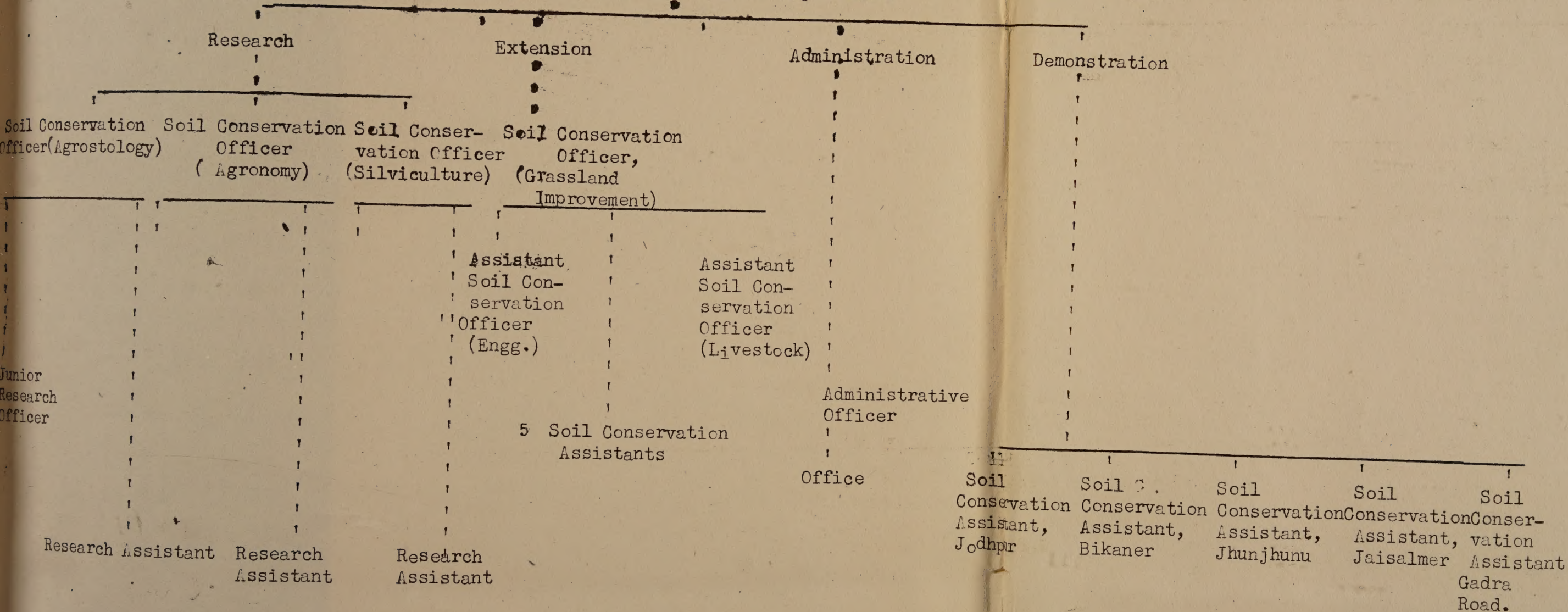
From the humble start made in 1952 the Station has now grown to its present status. Activities under the Station, however, cannot yet be considered as touching all the intricate problems faced in desert environments. Hydrology, desert biology, socio-economic studies are fundamentally important to the land utilisation studies so far undertaken by the Station and can alone be taken up by a far bigger organisation than the present set up at the Desert Afforestation & Soil Conservation Station.

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Rc.

DESERT AFFORESTATION & SOIL CONSERVATION STATION, JODHPUR ORGANISATIONAL SET-UP

Chief Research Officer
Technical & Administrative Supervision



10824, 1957

NOTE ON AGRONOMIC RESEARCH AT
DESERT AFFORESTATION & SOIL CONSERVATION STATION
JODIPUR

Land in western Rajasthan in general is not suitable for crop raising unless improved methods of soil and water conservation are adopted by the farmers. Also, this may be indicated that local agricultural land has not been classified on land use pattern basis and, therefore, every type of available land is brought under plough including sand dunes to gravelly lands and thus exposing the land to severe wind erosion. The present system of cropping is not economical to the farmers because not only they get very low yields but also crops generally fail for want of proper technical knowledge regarding soil conservation methods for arid areas. It has been observed that all the crop lands are open and exposed to wind erosion as they have no provision of wind-breaks and shelterbelts. The practice of the farmer to harvest the crop and stubble is detrimental to the field which normally should have a mulch cover of crop residue to conserve the soil fertility, and to control wind erosion.

The successful farming in arid and semi-arid zone depends on adopting such agricultural practices as will reduce the chances of soil erosion to the minimum and improve chances of soil and water conservation. There has been no work in Agronomic Research in this region so far, and there is no reliable data on present system of cropping, method of tillage, use of fertilisers, crop rotations, use of improved varieties in arid and semi-arid lands of Rajasthan. There is an urgent need for making a planned scientific approach to the problem of land utilisation for implementing a programme of successful dry land farming on the basis of Agronomic Research.

The Agronomic Research at this station was started in Kharif 1958 at Central Research Farm and other units. The Research programme has been envisaged to find out best suitable good farming practices for the western part of Rajasthan. Dry farming techniques with soil and moisture conservation practices have been incorporated in the trials. The most suitable varieties of various crops of cereal and legumes for this region have yet to be found out. The varietal trials have been incorporated in the programme. Manurial, rotational and cultural experiments including mixed cropping and wind strip cropping have been scheduled to study their effectiveness and their role in soil and water conservation in the programme. The study of windbreaks and its protection on cropped land has been envisaged. Stubble mulching and sand dune stabilizing by crop raising has been included. It is also endeavoured to try to introduce new crops suitable for this region.

Study of soil fertility, soil texture, soil structure and soil moisture has been incorporated in this plan. Wind erosion studies will be made to determine the amount of soil being blown at different heights from the ground surface and the size of soil particles would be determined. Pot culture studies will be made of trace elements and drought resistance of crop plants. The details of the experiments

are as below:-

In Kharif 1958 the following experiments were laid down at Central Research Farm, Jodhpur:-

Experiment No. 1.1/58: Varietal trial of Bajra:

Object: To find out suitable variety of Bajra crop for semi-arid zone of Jodhpur. The average crop production of Bajra in western Rajasthan works out only to 98 lbs. per acre presently. This out-turn is extremely poor. The crop produce can be increased if the suitable variety is introduced for the locality.

Experiment No. 1.2/58: Varietal trial of Jowar for semi-arid and arid zones of this region. (Jodhpur)

Object: - The average crop production per acre of Jowar crop as grain in western Rajasthan works out to be 115 lbs. per acre. The crop yield can be increased by using suitable variety for this locality. This experiment will enable to find out the same for this region.

Experiment No. 1.3/58: Role of different legumes with varying doses of P_2O_5 in soil conservation under arid and semi-arid conditions.

Object: The experiment is laid out to find out the production per acre of different legumes grown in this part of Rajasthan with and without application of superphosphate.

Experiment No. 3.1/58: Seed rate, spacing cum manurial trial of Bajra.

Object: To find out proper amount of seed rate and distance for Bajra crop for the region and the suitable doses of farm yard manure for optimum production of these cereals under the semi-arid and arid conditions of Rajasthan.

Experiment No. 3.2/58: The relation of crop rotation to soil fertility and its effect on soil losses.

Object: To study the effectiveness of crop rotations on soil fertility and crop yields under rain fed conditions. Cereal followed by cereal, cereal followed by legumes and cereal followed by fertilized legumes have been included in this study.

Experiment No. 4.1/58: Stubble mulching (Cultural)

Object: It is generally recognised that residue maintained on the surface of the soil helps to control wind erosion. Leaving litter which is sometimes called stubble mulch or crop residue on the ground surface help to prevent wind erosion and stabilizes the ground surface. In arid and semi-arid regions of western Rajasthan the technique of stubble mulching will be of great help in reducing soil losses by wind erosion but as there has been no experimentation on this technique the suitable details have to be worked out. This experiment is laid out to estimate

the most desirable size of the stubble for effective prevention of wind erosion and to compare it with no mulching.

Experiment No. 4.2/58: Wind strip cropping:

Object: Wind strip cropping involves the regular farm-crops in straight parallel strips at right-angle to the natural direction of the prevailing wind to avoid and resist the wind forces so that the wind erosion menace may be prevented or reduced. This principle of wind strip cropping has not yet been tried or practised in any part of Rajasthan. It is, therefore, desired to try out by experimentation and only then the recommendation can be made in favour of this system of cropping.

Experiment No. 4.4/58: Mixed cropping (associated growth of cereals with legumes)

Object: Mixed cropping is a common practice in dry farmed areas where cereals are sown mixed with legumes crops. The advantages as understood are prevention of crop failure due to uncertain rainfall and better growth of the associated non-legumes with legumes on poor soils. The restorative effects of leguminous crops have also been recognised. The different crops have varying root depths and they tap different layers of soil for plant food. The total produce by way of mixed cropping should give better results compared to single crop yield.

In various parts of Rajasthan, the practice of mixed cropping has been invogue. However, no scientific information has been collected so far on the type of mixtures and the seed ratios or the fertility status of the field after the harvest of a crop mixture. Thus it is intended to find out the suitable crop mixtures, their seed ratios, crops yields and the fertility status of the field.

Experiment No. 9.1/58: The effectiveness of various trace elements on soil fertility and crop yield of Bajra.

Object: To study the response of Bajra crop to trace elements or minor elements, viz., ferrous, manganese, zinc boron, copper molybdenum and magnesium.

Experiment No. 10.1/58: Crop introduction and seed multiplication

Object: The attempt has been made to introduce cereals and legumes crop plants from other dry zones of our country and abroad. The phyto-plasticity of these introduced plants is being studied.

The Rabi experiments have been laid out at Pali. The details are as below:-

Experiment No. 12.1/58: Mixed cropping (Associated growth of cereals with legumes)

Object: The practice of mixed cropping has been invogue from times immemorial in western Rajasthan. However, the proper seed ratios and the proper seed for being mixed have not yet been scientifically determined

so far. In this experiment the attempt has been made to find out the scientific information in this regard.

Experiment No. 12.2/58: Date of sowing and frequencies of weeding.

Object: To find out the optimum time of wheat planting in this semi-arid and arid region of western Rajasthan. The effect of weed control on the crop yield, soil moisture, and soil fertility will also be studied in this experiment.

Experiment No. 12.3/58: Seed rate cum manurial trials.

Object: To find out optimum seed rate for maximum crop production with varying doses of F.Y.M.

Experiment No. 12.4/58: Physico-chemical changes in soil.

Object: To study the effect of soil working and its frequencies on soil texture, structure, moisture and on crop yields.

Experiment No. 12.5/58: Plant Introduction.

Object: The Rabi crop plants from different dry zones of the country have been introduced. Their adaptability under these environmental conditions and climatic variations are under study.

POT CULTURE STUDIES:

The importance of the problem of drought resistance in field crops has been increasingly recognised during the recent years. In the semi-arid and arid regions, the recurrence of drought has been a limiting factor for crop production. Western parts of Rajasthan where the rainfall varies from 4" to 16", it is rather essential to have tested varieties of crops in the farmers' fields which are real drought resistant.

The use of yield trials as an index for drought resistance has not proved entirely satisfactory under dry conditions because early varieties may have high grain yields, but are drought escaping rather than drought resistant. For this reason several pot experiments have been designed to give a fair trial to several varieties to exhibit their comparative ability to survive after they have been subjected to drought.

In the present series of investigations the following studies will be made:

- 1) Drought resistance of Bajra crop plant at different stages of growth (four weeks, six weeks and eight weeks)
- 2) The effect of hardening process on drought resistance of bajra plants.
- 3) The study of root development as related to drought resistance.
- 4) Relationship of soil moisture level to the drought resistance of different varieties of bajra (Pennisetum typhoidium)

In 1958-59 the pot culture studies have been made at the Central Research Farm, Jodhpur. The basic studies have been made to find out the comparative ability of various varieties of Bajra to drought resistance, their root study and hardening effect on these crop plants has been under progress. Furthermore, studies in this direction are planned for next year.

AGRONOMIC RESEARCH IN UNITS:

The agronomic experiments have been designed to be laid out in all the five units under the station in the current year.

24, 1955

XIV.1

Soil Conservation in the Rajasthan Desert

Work of the Desert Afforestation Research Station

Jodhpur

Central Soil Conservation Board



SOIL CONSTRUCTION IN THE RAJASTHAN DESERT— WORK OF THE DESERT AFFORESTATION RESEARCH STATIONS, JODHPUR.

Summary :

At Jodhpur Station research is conducted on the afforestation of various types of soils in the arid areas and on the silviculture of various indigenous as well as exotic species of desert plants. In order to control the shifting of sand and to prevent lifting of the sand by wind, shelterbelts are being planted in Rajasthan. Seeds and seedlings raised at the nursery attached to the Research Station, are distributed for raising shelterbelts etc. In order to stabilise the sand, it is proposed to convert



Shifting-Sands are a menace in Jhunjhunu, Sardarshahr,
Churu and various parts of Rajasthan—

sites not suitable for cultivation or liable to erosion, into pastures for sheep grazing, into plantations of shade and fodder yielding trees and occasionally into ponds for watering. Extension work will also be planned on a cooperative basis with the assistance of the people in the region.

I. Description of the Region—

The arid tract known as the Rajasthan desert is really the eastern part of Thar Desert of undivided India. Covering an area of nearly 80,000 sq. miles, it extends over parts of Saurashtra, North Gujarat, Punjab, Pepsu and West and North-West Rajasthan.

2. The Indian desert is a vast sandy plain. It is, however, not one flat level waste of sand but includes isolated hills or groups of rocky hillocks scattered over the area. In fact, the desert can be divided into several (NNE-SSW) belts. The westernmost belt, the 'Great Desert' has its solid geology completely covered by sand dunes of various shapes and sizes and runs from the Rann of Kutch along the Pakistan border to the Punjab. Next is the dune-free rocky Barmer-Jaisalmer-Bikaner-tract where the Jurassic to Eocene marine formations are exposed. On the eastern border of this rocky area is the 'Little Desert', which starting from the Rann meets the Great Desert again north of Bikaner. Then comes the basin of the Luni with the salt lakes of Didwana, Sambhar etc. The desert terminates to the south-west in the broad depression of the Rann of Kutch. The bulk of the alluvial country in the delta of the Luni and the Barmer-Jaisalmer, Bikaner tract is free from dunes.

3. Though, on the whole, the tract is sandy, the soil improves in fertility from west and north-west to east and north-east. The area at the foot of the Aravallies contains fertile lands. But in many parts, the soils are saline or alkaline with unfavourable physical condition and high pH value; and in the Rann of Kutch, salt, silt and mud flats are also seen. On the rocky hills and plateaus, the soil is very shallow and poor while on steep hill-sides there is no soil worth the name. Owing to the denudation of vegetation, the valuable top soil in many places has been washed or blown away, leaving behind unstable sand, gravel or loose stones. In places there are thick beds or impenetrable pans of calcareous tufa, kankar or gypsum below the sand.

4. The climate is characterised by great extremes of temperature. In winter temperature falls below zero, while during hot weather it may rise as high as 125°. The desert in western Rajasthan is the hottest part of India. The diurnal variations of temperature (from day to night) are also sudden and trying. Violent hot (and dust raising) winds are experienced

during the summer. The velocity may be as high as 85 m.p.h. Rainfall is very precarious and erratic. In some places it is 5" a year or even less. As one proceeds eastwards the rainfall increases. The variation in rainfall from year to year is large, and to make things worse, in general the coefficient of variation is greater for areas with less average precipitation.

5. Water is scarce and occurs at great depths, from 100 to 400 feet from the ground level. Some of the wells turn poisonous due to excess of salts. Tanks and ponds supply water for some part of the year, but with dry season, these tanks and ponds start drying up. People turn nomadic with their herds of animals. In years of scarcity the amount of damage done to vegetation is great. Famines are frequent. Almost every third year famine or scarcity conditions are expected. Such years take a heavy toll of animal life. During the dry season, especially in years of scarcity, the graziers with their livestock migrate to the better pastures of eastern and Central India.



AN OVER-GRAZED PASTURE

The scattered *Zyzyphus* bushes are preserved only due to religious sanctity.

6. A careful examination shows, however, that these sandy uplands can support considerable ground vegetation ; during and after the



Lopped Trees with Sand—dunes in the background (at Sardarshar)



Goats destroy vegetation

monsoons, the greater part of this zone becomes a vast green stretch. But, the uncontrolled lopping, excessive grazing and cultivation of marginal lands has resulted in the removal of surface cover and degradation of stabilized sites into shifting sands. Many examples are seen where heavy grazing in the sandy hills has caused a dune which was fixed to start moving and engulfing the adjoining fields and to smother wells, roads, railway tracks and habitations.

Thus, though the main causes of the desert are its adverse geographical and topographical features, the desert conditions have obviously been accentuated by the folly of man in over-grazing the area, cutting down the vegetation, removing grass and adopting faulty methods of cultivation.

II. Problems of the Desert and Their Solution.

7. Water Supply.—Water is the main problem of the arid and desert areas. The local people have their own simple methods of collecting and storing water. The few scattered ponds made of earth to collect rain-water need de-silting to make them retain water for longer periods. Various kinds of 'drought-ponds' could be constructed to collect rainwater for animals for drinking. An intensive search for underground water could be made and where such supplies are indicated, wells could be dug or bored and fitted with pumps. This could be followed by development of a system of "ranching" to discourage nomadism.

8. Animal Industry-Improvement of Grazing Lands. Rearing of cattle, sheep, goats and camels is the main occupation of the people of the desert. It is the breeding ground of some of the finest races of cattle, horses and camels in India and the main wealth of the people in the west and north of this desert zone consists of herds of these animals. Some of the finest bulls noted for their size are bred in Nagaur tract, while cows from Sanchoe and Mallani are famous for their yield of milk. The endurance of the Mallani and Jalore horses is proverbial and the best riding camels are bred in Bikaner.

As a result, extensive areas of pastures are over-grazed and trampled upon. The few scattered trees are lopped for fodder and the nomadic herdsmen migrate from place to place in search of better grazing and fodder. Improvement of these degraded grazing lands constitutes a difficult problem. A system of rotational or deferred grazing may be planned for the various grazing lands. Use of light tractors with disc-harrows and seeding such pastures would also help in their re-cuperation.

Propaganda and demonstrational works would go a long way in educating the people to halt further deterioration of grazing lands.

9. Shifting sands—an eternal menace :—Shifting sands, wherever they are, present a difficult problem. Sands invade roads, railway lines, fields and habitations. Removal of sand from railway tracks and roads is a recurring expenditure. Such sands could be permanently immobilized by vegetation at costs very much less than the huge annual expenditure involved in sand lifting. Use of shelterbelts and windbreaks (of trees, shrubs and grasses) helps a great deal in arid areas towards amelioration of conditions by affording much needed protection from the hot (or cold) and desiccating winds and the invasion of sand.

FUEL—SCARCITY



Twigs and branches of bushes (*Calligonum polygonoides*) being brought to Bikaner town from areas 40 miles away !

NURSERY WORK



A large number of Plants, both indigenous and exotic are raised in nurseries scattered over arid zone,

10. **Shortage of fuel** :—In the absence of sufficient treegrowth, the provision of wood fuel for the hearth becomes as important a problem as supply of fodder for the herds. Shortage of fuel can be so acute that even the roots of bushes are dug up and carried over miles of sandy and desolate wastes. Cowdung, goat and camel droppings have to be used as fuel. Plantations of trees on waste lands near villages, along fields and roads can provide cheap fuel, and would help diversion of farm yard refuse to enrich the soil. Shelterbelts and wind breaks can also be of much value as a source of firewood.

III. Progress of Work

11. Based on the recommendations of a committee of experts which toured western Rajasthan, the Desert Afforestation Research Station was started at Jodhpur in October, 1952. The station interests itself in—

- A. Study and Research on desert problems.
- B. Experimental afforestation and improvement of pasture lands, demonstration work in extension forestry.

12. Since 1952, the Station has carried out studies on various indigenous species. Data on rainfall, temperature, wind velocities and depth of incidence of water have been compiled.

A. STUDY AND RESEARCH.

13. Experiments on exotics are in progress. At the Central Nursery Jodhpur the following 13 out of 76 exotic tried, have proved successful in the nursery stage :—

- (1) *Eucalyptus camaldulensis*
- (2) *Eucalyptus robusta*
- (3) *Ailanthus glandulosa*
- (4) *Acacia oswaldii*
- (5) *Acacia cyanophylla*.
- (6) *Acacia cyclops*
- (7) *Acacia greggii*
- (8) *Acacia melanoxylon*
- (9) *Pinus brutia*
- (10) *Cupressus sempervirens*
- (11) *Brachychiton populneum*

(12) *Celtis australis*

(13) *Zizyphus spina-christi*.

14. Plant Introduction Experiments have been in progress at two places using indigenous as well exotic species. Notes are appended on suitable species.

15. Experiments have been in progress to find out the best methods of propagation of eight important grasses in order to obtain useful information with regard to improvement of pastures. Three different methods of propagation are being tested out—

- (i) Direct seeding.
- (ii) Transplanting of young seedlings.
- (iii) Transplanting of root stolons (sods).

The species under study are—

- (1) *Panicum antidotale*.
- (2) *Panicum turgidum*.
- (3) *Elionurus hirsutus* (Sewan)
- (4) *Andropogon halepensis*
- (5) *Chloris gayana*
- (6) *Dicanthium annulatum* (Karda)
- (7) *Cenchrus biflorus* (Dhaman)
- (8) *Pennisetum cenchroides*.

The results so far obtained indicate that *Elionurus hirsutus* (an important and nutritious grass of the desert and locally known as Sevan) and *Panicum turgidum* can be propagated by direct sowing while *Panicum antidotale* and *Dicanthium annulatum* can be best propagated by transplanting as well as sod-planting. Direct sowing as well as sod planting gave equally good results in the case of *Pennisetum cenchroides*, *Cenchrus biflorus* and *Chloris gayana*. The experiment is being continued.

16. Ecological studies have been started on initial stages of vegetational development on different kinds of soils.

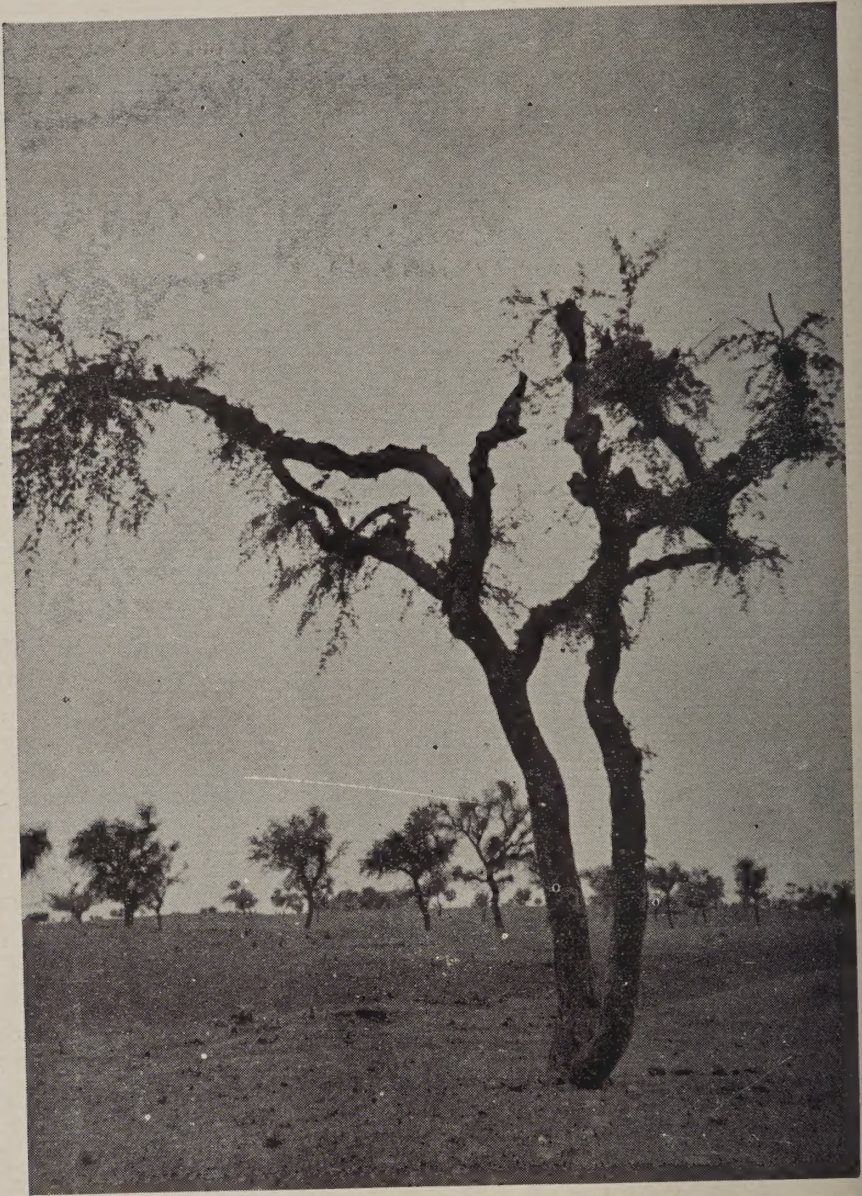
(i) Observations on rocky areas indicate that on closure to grazing and fencing, the following species colonised the area, with *Nazia recemosa* dominating over other species in the first year :—

- Grasses :—
- (1) *Aristida hystrix*
 - (2) *Eragrostis unioides*
 - (3) *Dinebra retroflex*
 - (4) *Eremopogon elegans*
 - (5) *Nazia recemosa*,

Shrubs :—(1) *Lepidagathis cristata*

(ii) On shifting sand-dunes-at Sardarshahr (Bikaner Division) where the annual rainfall is about 8-10 inches the first coloniser was *Cyperus arenarius* along with :—

—LOPPING OF TREES—



Trees of *Prosopis spieigera* are badly lopped for fodder and fencing of fields—

- (1) *Aristida hirtigluma* (2) *Aristida funiculata* (3) *Cenchrus catharticus* (4) *Indigofera cordifolia* (5) *Farsetia jacquemontii*

At Jhunjhunu, on shifting sand-dunes (annual precipitation 15"-16") the only additional species, besides the above were *Crotalaria bushia* and *Panicum turgidum*. The experiments are being continued.

16. The best procedure for the lopping of some important fodder tree species, *Prosopis specigera* (locally known as Kherjri) is under examination. 32 trees were selected and 3 different degrees of lopping have been adopted. Only one lopping during the winter was done and the loppings weighed. The following degrees of lopping were tried :—

- (1) 1st group (8 trees)—Lopping of the lower 1/3rd of the Crown.
- (2) 2nd group (8 trees)—Lopping of the lower 2/3rd of the crown.
- (3) 3rd group (8 trees)—Entire crown was lopped, leaving on a few top shoots.

(4) 4th group (8 trees)—No lopping (control) It is too early yet to arrive at any conclusions. The experiment will be concluded after 10 years of observations.

B. EXTENSION WORK AND DEMONSTRATION

17. During the last three years of its existence, the Jodhpur station has established 9 nurseries in Western Rajasthan where trees and grasses are raised, for experimental afforestation, avenue-planting and distribution at the following places :—

1952-53	1953-54	1954-55
1. Jodhpur	2. Jhunjhunu	5. Gadra Road
	3. Sardarshahr	6. Barmer
	4. Pali.	7. Chirawa,
		8. Beriganga (near Jodhpur)
		9. Pokran.

18. **Seed Store** :—Seeds of different trees and grass species have been collected and distributed on a large scale to various agencies, institutions, etc., along with instructions for their effective utilisation. During the last three years, 71,371 lbs. of seeds of different species were distributed to 1778 agencies for creation of oases of vegetation.

19. **Avenue Planting along Roads**—Besides the shade and shelter which is needed along the roads in the desert region, the avenues

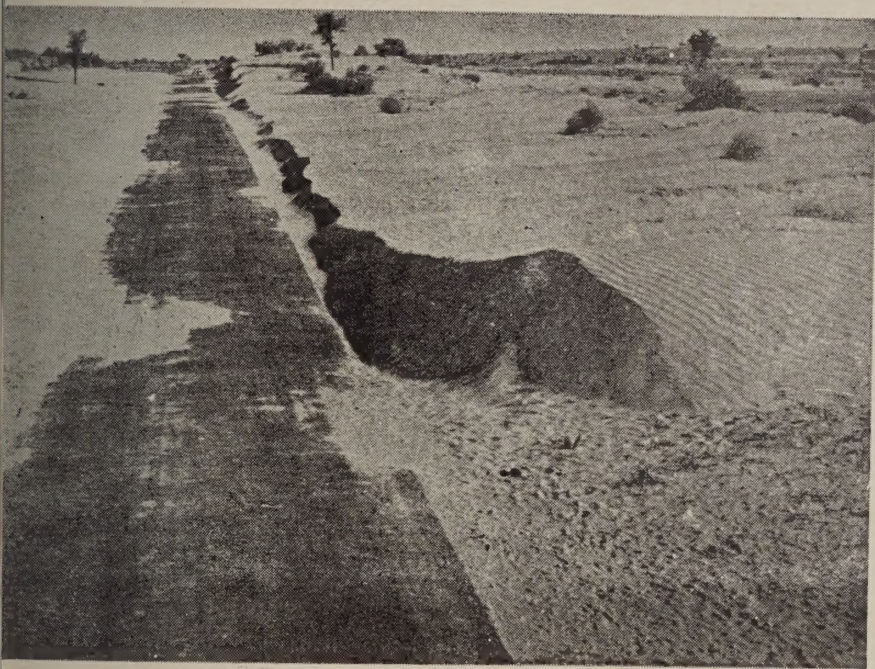
provide protection to adjoining fields and lands against hot and desiccating winds. A total of 52 miles of roads has been planted up with 2-3 rows of trees on either side of the road.



Sand-Invasion on Railway Line

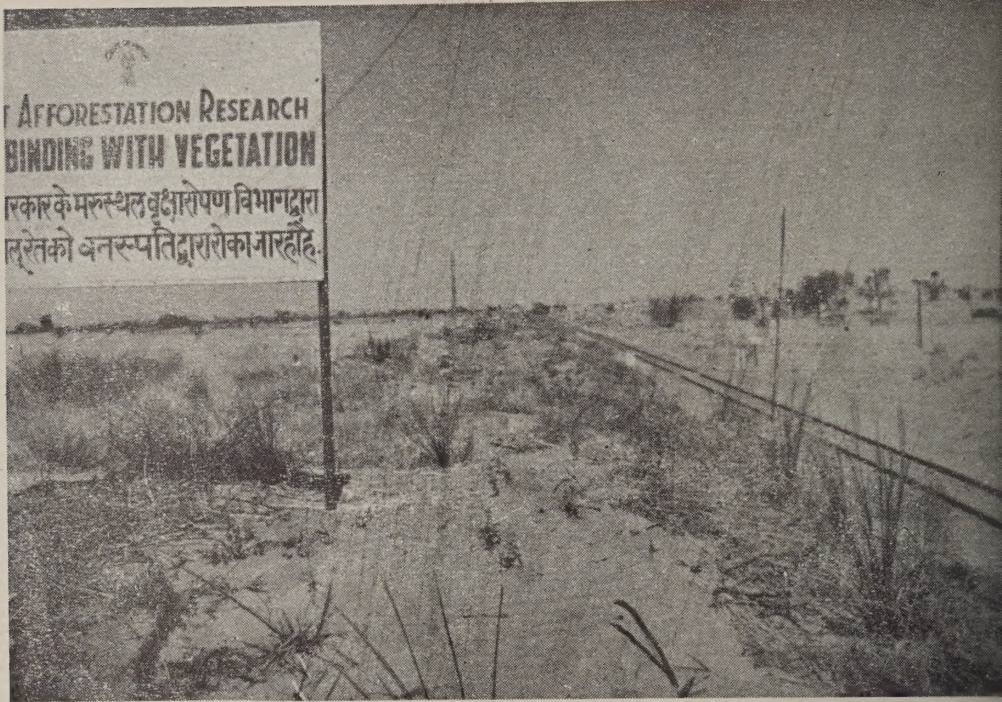
20. Fixation of sands along Railway tracks :—In some stretches shifting sands invade railway lines during summer months and Railway authorities have to incur considerable expenditure every year on the clearing of such sands. The Research Station has achieved noticeable success in immobilizing the sand at 5 places near Sikar and Bikaner. The works taken up initially during 1954 are being maintained at the following places :—

- | | | | |
|--------------------|----------------|-------------------------------|---------------|
| 1. Sikar-Loharu | line (W. Rly) | Pole lengths 148/19 to 149/14 | or 4200 feet. |
| 2. Sikar-Fatehpur | „ „ „ „ | 0/8 to 0/13 | or 1250 „ |
| 3. „ „ „ „ | „ „ | 3/12 to 3/16 | or 1250 „ |
| 4. Palana-Deshnoke | „ (N. Rly) „ „ | 301/15 to 301/10 | or 1000 „ |



Invasion of Sand on Roads and Rly. Lines is a menace..Clearing Sands is a recurring expenditure.

.....Control of Sand Along Rly. Lines.....



Immobilization of shifting Sands along railway tracks is a permanent cure—Is much cheaper also in its initial stages..Moreover, it starts giving revenue soon after—

5. Palana-Deshnoke line (N.Rly) Pole lengths 303/2 to 303/3 or 500 feet.

Total length—8000 feet.

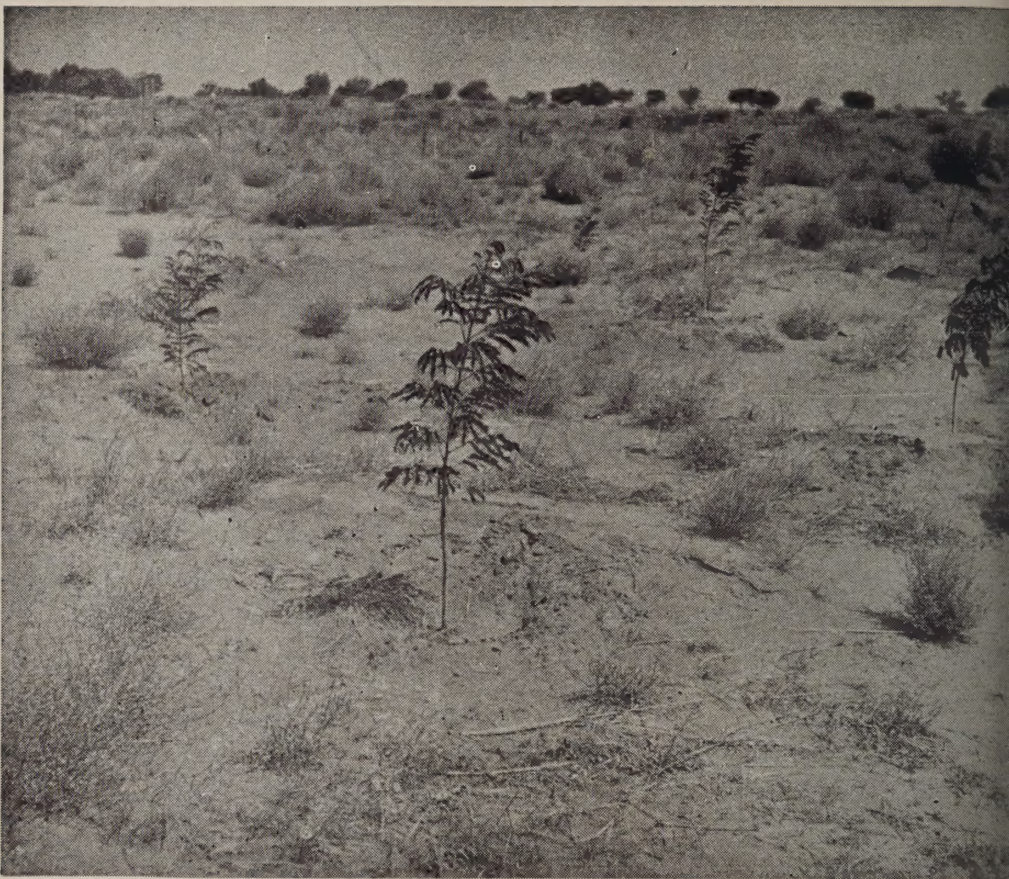
The fencing of thorns erected on the western side of the track near Sikar in 1954 was buried by blown sand and had to be renewed. Spreading of mulch over mobile sand within and outside the area was also done. Broadcast-sowings of seeds of numerous species was done, such as *Prosopis spicigera*, (Khejri) *Prosopis juliflora*, (wilaiti Khejri) *Tecoma undulata*, (Rohera) *Acacia senegal*, *Acacia arabica* (Babul) *Balanites roxburghii*, (Hinjan) *Zizyphus jujuba*, (Ber) *Calligonum polygonoides* (Phok) *Leptadenia spartium* (Khip) *Citrullus colocynthis* (Indrayan,) and *Cassia auriculata* (tarwar). Out of these *Acacia Arabica* was most successful attaining a height of 3'-5" in one year. *Acacia senegal*, *Prosopis spicigera* *Zizyphus jujuba* also succeeded. Very few seedlings of *Tecoma undulata* survived. The percentage survival of seedlings of *Prosopis juliflora* was low due to attack

by termites. Those that survived attained a height of 6-8 feet in one year. Transplants of *Prosopis juliflora* (wilate Babul), *Azadirachta indica*, (nim) *Albizia leblak* (Sirish) and *Ailanthus excelsa* were also planted. *Prosopis juliflora* failed but all other species succeeded. In addition to the above, branch-cuttings of *Tamarix articulata*, (jhau), *Calligonum polygonoides* (Phok) and root-stolons of *Saccharum munja* were also planted. *Tamarix articulata* though promising in the beginning has to be watered during the first year. It is liable to attack by white ants. *Saccharum munja* was found most successful with its rapid growth. Replacement of casualties was carried out, the mortality being due to drought, termite attack and frost being large.

Initial observations indicate that this process of stabilising the sands is likely to prove effective and economical. In fact, appreciation of binding sand by means of vegetation along railway tracks has led to requests for extension of such work from the Railway engineers concerned.



Effect of closure—. . Protection means growth of vegetation—



“SHELTER—BELT—PLANTATIONS” in Jhunjhunu sandy area

SAND-DUNES FIXED—



Immobilization and Afforestation of Barren Sands in Jhunjhunu

The difference in 2 years



The 'Bir' (Grazing Land) near Pali—1953. Trenches dug to conserve moisture and seeds sown.



The same in 1955 !

21. Experimental afforestation and improvement of Pasture lands. Demonstration work of afforestation on two different kinds of area has been started, viz., (1) Shifting sands, and (2) Rocky overgrazed lands. Two plots each of one thousand acres, are being treated. Various methods of control of shifting sands in Jhunjhunu, Sardarshahr and Churu have proved successful. Sand dunes are stabilised initially by 'mulching', which involves spreading of brushwood in-parallel rows against the direction of wind. Seeds of grasses and tree species are broadcast. At the break of first monsoon showers, root-clumps of grasses are planted in the sand and tree species are transplanted in the form of shelter-belts.

Afforestation of rocky areas and of grazing lands is also in progress. A crop of Babul (*Acacia arabica*) has been developed on a depleted piece of grazing land near Pali. Different methods like contour ploughing, ridging and trenching are being tried. In an over-grazed and depleted grazing land near Pilani useful species of fodder trees like Babul (*Acacia arabica*) and Khejri (*Prosopis spicigera*) have been successfully introduced along with Rohera (*Tecoma undulata*) through sowings. The last named species is the "teak of the arid zone" It is good timber. In olden days big-sized trees were found in large numbers, as is clear from the size of beams used in houses, doors and door-frames and furniture. This species is more or less disappearing, whatever trees are left are all stunted and useless as timber. The Jodhpur Research Station has been trying different methods of its propagation and resuscitation.

22. Creation of vegetation on the western Border. A strip of undulating sandy area about 40 miles in length and of varying width has been acquired towards the western border of Rajasthan. The area has been closed to grazing and efforts are being made to introduce tree species in parts of this area. The Rajasthan Government carried out aerial sowings for two years but success has been negligible. The idea of creating a belt of vegetation on the western border has been abandoned and large numbers of blocks for afforestation, soil conservation and range management are being taken over instead.

23. Organisation. The work of the immobilization of the Rajasthan Desert is in the charge of one Chief Research Officer who is stationed at Jodhpur. He is assisted by a Senior Research Officer and a Junior Research Officer. These officers conduct research on silviculture of tree species and carry out experiments on methods of clothing the sand-dunes with vegetation. There are four forest range officers and other supporting staff of Foresters, and Forest guards stationed in other places of work viz. Jodhpur, Barmer, Gadra Road, Pali, Sardarshahr and Jhunjhunu.

This work is under the administrative control of the Central Soil Conservation Board of the Ministry of Food and Agriculture.

24. **Publicity.** A larger number of wall-charts and posters have been made. Exhibitions on reclamation of the desert were arranged in the Railway Centenary Exhibition train at Jodhpur, and also at the Industrial and Agricultural Exhibition, Jodhpur. Officers of Press Information Bureau, Press representatives and a Reporter of an American magazine visited the Station. Various illustrated articles were published in the papers. A documentary film about the activities of the Station entitled "Save our Soil" was also released. Lectures and film-shows have been arranged at various institutions, Colleges and N.V.F. Camp. A talk in Hindi ("Marusthal ko Chunauti") was broadcast from the All India Radio Station, Jodhpur. A still camera, a 16 mm projector and a movie camera are the equipment in use for taking and showing of photos and films of the activities of the Station and to conduct educational publicity.

NOTES ON DESERT FLORA SUITABLE FOR RECLAMATION

(A) Tree Species

(1) *Tecoma undulata* (Vernacular Name—*Rohira*).

A tree 30 to 60 feet in height nearly evergreen with drooping branches. Large yellow to orange flowers, appearing from January to April, when the tree presents a very handsome sight.

Well worthy of cultivation for its elegant foliage and beautiful flowers. The bark is used in Sind as a remedy for medicinal purposes; leaves are eaten by cattle, wood is strong like teak, tough and durable, takes fine polish and is highly prized for furniture and carving work. Can be propagated by entire transplants, or by direct sowings.

(2) *Prosopis spicigera*. (Vern. *Deshi khejri Jand.*)

A moderate sized tree of 30—60 ft. height, nearly evergreen sending its roots very deep in the ground.

The tree is found in dry and arid regions of India. It flourishes well on alluvial grounds where soil consists of a varying mixture of sand and clay.

Wood very hard, it makes excellent fuel and charcoal and is used locally for various purposes. Pods used as fodder for camel, goats etc. and for vegetable when un-ripe. The only tree under which agricultural crops can flourish. Propagation is through transplanting of seedlings from pots or by direct sowing.

(3) *Prosopis juliflora* (Vern. *Vilavati khejri*)

A hardy tree, found very useful for afforestation of dry and arid tracts. It grows on all types of soil in dry regions. It is fast growing. Timber is excessively hard and remarkably durable and used in making knees of boats, posts for fencing, as a cheap fuel. Pods are sweet and succulent, are eaten by cattle, goats, camels and donkeys. Can be propagated by root-shoot cuttings. One year old plants are made into cuttings in March, which are planted in nursery beds to sprout and transplanted in the rains.

(4) *Azadirachta indica*—(Vern. *Nim*)

A tree, fairly evergreen with rounded crown and moderately thick furrowed bark. The tree may attain a height from 30-50 ft. Small white flowers, smelling of honey, appear from March to May, Fruits ripen during June-August.

An excellent avenue tree. Almost every part of it is used for medicinal purposes. The bark is a bitter tonic, astringent, useful in fever, thirst nausea, vomiting and skin diseases. The exude from bark is a good stimulant. Fruit a purgative and is useful in treatment of intestinal worms, urinary diseases, piles, etc. The wood is hard and durable, used for building, furniture and many other purposes. It could be propagated from plants raised in nursery and transferred into pots, and and reared for 1-3 years before transplanting. On a rainy day direct transplants from nursery beds can also be put out.

(B) **Grasses** :—1. *Cenchrus ciliaris* (Syn. *Pennisetum cenchroides*)

Vernacular name—*Dhaman*.

Common on sand dunes and drier parts of Rajasthan. An excellent fodder for horses and cattle. Believed to increase the milk yield of cows.

Propagation—By direct seed or by planting cut roots to lons.

2. *Elionurus hirsutus* .—(Vern. *Sewan*.)

One of the most popular grasses abundantly growing on dry sandy plains and dunes in western Rajasthan. Very nutritous, increases milk and fat yield of cattle fed on it. Can be raised from broadcasting the seed.

3. *Cenchrus biflorus* (Vern. Anjan Dhaman.) Generally grows on sandy soil one of the very nutritious Indian grasses, and considered by some to be the very best. The hay is good.

Propagation—By direct sowing of seed or sod.

4. *Panicum antidotale* (Blue-Panic. Vern. Name-*Gramna*)

A tall perennial fodder grass usually grows in clumps or in the shelter of bushes and hedges on sandy soils. Very quick growing. The smoke of the burning grass, is used for fumigating wounds and also as a disinfectant in small-pox. Can be propagated by direct sowing of seed or by sod.

5. *Dicanthium annulatum*. (Varn. Name *Karda*)

Perennial, densely tufted grass. Common in hedges and on road sides. Abundant in old grasslands and flourishes on cultivated fields, gardens and in sheltered places.

A good fodder grass and is eaten at all stages. Considered best for horses. Propagation is easy by direct seeding in moist places.

PRINTED AT ALBION PRESS, KASHMERE GATE, DELHI

24/1959

XLV.2

ANNUAL REPORT
OF
DESERT AFFORESTATION & SOIL
CONSERVATION STATION, JODHPUR

CENTRAL SOIL CONSERVATION BOARD



सत्यमेव जयते

GOVERNMENT OF INDIA
MINISTRY OF FOOD AND AGRICULTURE
1956

PRINTED IN INDIA BY THE MANAGER
GOVT. OF INDIA PRESS, NASIK ROAD, 1957

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ANNUAL REPORT ON THE WORK OF THE DESERT AFFORESTATION RESEARCH STATION, JODHPUR FOR THE CALENDAR YEAR ENDING DECEMBER 31, 1956

Summary

The Desert Afforestation Research Station, established in October, 1952 continued its research and extension work.

Experiments on plant introduction, grass propagation, lopping of *Prosopis spicigera*, that were laid out in previous years were maintained and observations recorded. Besides repeating the germination tests on exotic seeds received in previous years, fresh stock of seeds received from countries like Israel, Australia, U.S.S.R., Chile etc. was also subjected to such tests in the Central nursery at Jodhpur. Seven new experiments on Plant Introduction, Pasture improvement, Soil working for sowing and planting and determination of best size of *Prosopis juliflora* stumps for planting as potted sprouted stumps were laid during the year under report.

Meteorological data on temperature, humidity, rainfall and wind velocities etc. were recorded at various sub-stations.

Two more nurseries, one each at Suratgarh and Jaitsar, were established besides maintaining and improving the existing nine nurseries. These nurseries contained a stock of over half a million plants of various species.

551 md. 1 sr. 4 ch. seeds of tree species and 23 mds. 11 srs. 8 ch. of grass species was collected by various ranges of the Station. This seed was supplied to different indenting agencies and also utilised for seeding various demonstration afforestation areas. A sum of Rs. 4615-5-0 was spent on such collection.

Potted plants and seeds in small quantities were given almost free to such persons who desired to plant up their compounds or other such areas.

The programme of planting road avenues along highways, particularly those running North-South was continued. Besides maintaining and tending about 50 miles of avenues planted up in previous 3 years further 33 miles of roads were planted up during the year. Some more 'bad points' were taken up for immobilisation of shifting sand along railway tracks.

Experimental afforestation was carried out over 300 acres of rocky area, 209 acres of grazing lands and 188 acres of shifting sand dunes. Areas so worked in previous years were maintained by timely weedings, soil working, 'beating up' of casualties and repairs of fences.

36 square miles of 'border belt' acquired by the Station was demarcated with stone posts and no efforts were spared to exclude grazing, burning and cutting from the area. Afforestation programme was continued in the two localities—near Girab and inside the fenced plot about 8 miles from Gadra Road.

Soil Conservation trainees from Dehra Dun, Kotah and Ootacamund, and forestry students of Dehra Dun Forest College and Shivpuri and Rajasthan Forest Schools visited various works carried out by the station. A list of these and other distinguished visitors to the areas of the Station has been given.

Shri G.S. Lamba, retired from the post of Chief Research Officer in September and Shri S. Pathak who had taken over charge from Shri O.N. Kaul in January continued in the post of Junior Research Officer. Shri Mahendra Prakash continued to be Senior Research Officer.

The Station was reorganised and renamed as 'Desert Afforestation & Soil Conservation Station' with effect from December, 1956. Statement of staff sanctioned under the reorganised scheme has been given.

Out of a sanctioned grant of Rs. 6,65,000/-, a sum of Rs. 2,35,592-11-0 had been spent up to end of December, 1956.

ANNUAL REPORT OF DESERT AFFORESTATION RESEARCH STATION, JODHPUR FOR THE YEAR ENDING DECEMBER 31, 1956

Introduction

1. The Desert Afforestation Research Station, Jodhpur continued its research and extension work as per the statute defining the functions of the station. These works were done under the guidance of the Central Soil Conservation Board, Ministry of Food and Agriculture, Government of India. The succeeding paragraphs give in brief the activities in the above fields.

Research Work

2. During the year, phenological observations were recorded for 80 trees of the following 8 species at 10 trees of each :

- (i) *Acacia arabica*
- (ii) *Acacia senegal*
- (iii) *Ailanthus excelsa*
- (iv) *Albizia lebbek*
- (v) *Azadirachta indica*
- (vi) *Prosopis juliflora*
- (vii) *Prosopis spicigera*
- (viii) *Tecoma undulata*

(ix) In addition, 5 trees of each of item numbers 2, 4, 5 & 7 have been selected for such observations at Gadra Road.

3. Studies on germination capacity and subsequent growth of seeds of various species received from abroad were undertaken at the Central Nursery, Jodhpur. Besides repeating the trials on the seeds received in the previous years and stored in the Central Seed Store, seeds of various other species received during the year were taken up for similar studies. In all, seeds of 83 species from abroad, viz., 40 from Israel, 25 from Australia, 10 from U.S.S.R. and 8 from Chile were sown in the Central Nursery at Jodhpur with a view to test their suitability for introduction in the arid zone of Rajasthan. Results of these trials form Appendix I.

Also, about a dozen grass species from U.S.A. and South Africa were tried. Out of them only *Eragrostis curvula* germinated well and has been successfully established in beds in the nursery.

Out of the 13 species which were mentioned in the last annual report as having shown promise in the nursery stage, plants of *Cupressus sempervirens*, *Brachychiton populneum*, *Pinus brutia*, *Celtis australis* and *Zizyphus spina-christii*, could not survive the severe summers of 1956. Plants of *Acacia oswaldii*, *A. Cyclops*, *A. melanoxydon*, *Ailanthus glandulosa* and *Eucalyptus robusta* were too few for field trials. These, however, could survive the summer under nursery condition in pots. *Acacia* being of little economic use was not given field trials.

Eucalyptus camaldulensis and *Acacia cyanophylla* have been planted in Plant-Introduction plots and results are encouraging.

Out of the species sown during the year under report the following germinated well and showed promise. However, it is too early to say anything definitely till they have survived one summer—

- (i) *Eucalyptus albens* (Australia)
- (ii) " *Gomphocephala* (Israel)
- (iii) " *diversicolor* (Australia)
- (iv) " *tereticornis* (Israel)
- (v) " *occidentale* (Israel)
- (vi) " *robusta* (Australia)
- (vii) " *rudis*
- (viii) *Acacia cyanophylla* (Israel)
- (ix) *Schinus terebinthifolia* (Israel)

4. From the experiment laid out last year to determine the best method of propagation of the 8 fodder grasses viz. *Andropogon halepensis*, *Cenchrus biflorus*, *Cenchrus ciliaris*, *Chloris gayana*, *Dichanthium annulatum*, *Elionurus hirsutus*, *Panicum antidotale* and *Panicum turgidum*, the following observations were made:—

(a) Although *Elionurus hirsutus*, *Panicum turgidum*, *P. antidotale*, *Cenchrus ciliaris*, and *C. Biflorus* established best by direct sowing during the first year, transplanted material caught up in population and density with the seeded plots.

(b) Ground cover in respect of *Andropogon halepensis* and *Dichanthium annulatum* decreased in the second year.

(c) *Chloris gayana*, which had established both by sowings and transplanting in the first year became extinct in the second year.

5. An experiment to determine the best size of *Prosopis juliflora* stumps for planting in the field after sprouting to compare their survival and subsequent growth, was laid in April, 56 at Beriganga in compartment 3. Four randomised blocks, each having 16 plots in 4 rows of 4 each, were laid. 25 sprouted stumps were planted on 8th July in each plot in half filled 18" cube pits, 10' apart, in staggered fashion and bounded by a crescent shaped bund across the local slope to catch water.

Performance of 16 treatments viz. 4 diameter classes of root at collar ($\frac{1}{4}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ " and $\frac{5}{8}$ ") combined with 4 lengths of root (3", 5", 7" and 9") was under investigation. Stumps were prepared from seedlings sown in November, 1954 and planted during April '56 in earthen tubes 10" long and 4" diameter filled with soil. These containers were arranged in blocks, treatment-wise. Factors like watering and shading were kept identical for all treatments. Date of sprouting of each stump was recorded.

6. Studies on plant succession in various enclosed areas with different soil conditions were continued. Due to heavy rat infestation, any tangible observations regarding succession were not possible.

7. Observations on the 1955 Plant Introduction Experiments, both at Beriganga and Pali, were continued. (e.g. Appendix II & III). Three more such experiments, one each at Sardarshahr, Gadra Road and Pali, were laid out during the year. *Acacia cyanophylla*, *Eucalyptus rostrata*, *Casuarina equisetifolia* from Jodhpur Central nursery and *Ailanthus excelsa* transplants, *Prosopis juliflora* bricks and sprouted branch cuttings of *Tamarix articulata* were planted on shifting sand dunes in compartment 4 at Sardarshahr in 5 blocks of 6 plots each in randomised block design. 25 plants of each species were planted in each plot.

The undermentioned species were planted in Gadra Road range within the border belt on consolidated sands in randomised block design. 18 plants of each species were planted in each plot with 10 replications. 80 plants of *Acacia cyanophylla* were planted along the periphery to watch their performance.

Species planted.—Potted plants of *Albizzia lebbek*, *Cassia siamea*, *Casuarina equisetifolia*, *Eucalyptus rostrata* and sprouted branch cuttings of *Tamarix articulata*.

A Plant-Introduction experiment to find out the suitability of *Eucalyptus rostrata*, *Dalbergia sissoo*, *Casuarina equisetifolia*, *Holoptelea integrifolia*, *Kigelia pinnata*, *Albizzia amara*, *Moringa pterygosperma*, *Inga dulcis*, and *Ferronia elephantum* for arid zone afforestation was laid out in compartment number 5 at Pali. 25 plants of each species were planted 20' apart in staggered Goor type pits in each plot with four replications.

8. Experiment on finding the best method of lopping of *Prosopis* species, the most important fodder tree of the region, was maintained. Yield data from the 3 different groups form appendix III.

9. Meteorological data on temperature, humidity, rainfall and wind velocity were recorded at Gadra Road, Jhunjhunu, Sardarshahr and Jodhpur.

10. The following new experiments besides 4 plant introduction experiments mentioned in paras 5 & 7 above, were laid during the year under report :—

(a) To study the effect of soil working and seeding on natural pastures.

At Gadra Road, inside the fenced area within the border belt, plots of 5 acres each were demarcated and the following treatments were applied on a randomised pattern :—

- (i) Seeding without soil working.
- (ii) Soil working without any seeding.
- (iii) Soil working and seeding.

Each treatment was triplicated. Surrounds of the plots were left as controls.

Soil working was done with a disc harrow drawn by tractor and mixture of the following grass seeds (unclean with chaff) was broadcast @ $35\frac{3}{4}$ seers per acre.

	Weight.	
	mds.	srs.
<i>Elionurus hirsutus</i>	9	35
<i>Panicum antidotale</i>	2	19
<i>Cenchrus ciliaris</i>	1	0
<i>Eleusine flagellifera</i>	3	36
<i>Dactyloctenyon sindicum</i>	3	27
<i>Andropogon halepensis</i>	3	0
<i>Panicum turgidum</i>	2	39

(b) To find out the best size of ridge ditch type of soil working for arid zone afforestation by sowings.

An experiment to compare the effect of various lengths of ditches on the successful establishment of seedlings from direct sowings was laid out in compartment number 5 at Pali. Six types of soil working were under investigation, viz:

- (i) Goor type pits $2' \times 2' \times 1\frac{1}{2}'$ at $20' \times 20'$ espacement from centre to centre.
- (ii) $3' \times 2' \times 1\frac{1}{2}'$ pits, half filled with excavated weathered earth so as to form a ridge along the bisector of the longer side at $20' \times 20'$ espacement centre to centre.
- (iii) $6'$ long $\times 2' \times 1\frac{1}{2}'$ trenches, half filled with excavated weathered earth in line $20'$ apart and trenches in the same line at $20'$ centre to centre spacing.
- (iv) $10' \times 2' \times 1\frac{1}{2}'$ trenches, half filled with excavated weathered earth in lines $20'$ apart and trenches spaced $20'$ end to end in each line.
- (v) $20' \times 2' \times 1\frac{1}{2}'$ trenches, half filled with excavated weathered earth in lines $20'$ apart and trenches spaced $20'$ end to end.
- (vi) $20' \times 2' \times 1\frac{1}{2}'$ trenches, half filled with excavated weathered earth in lines $20'$ apart and trenches spaced $20'$ end to end and interspaces between lines of trenches worked up by harrowing.

All trenches were staggered. Each plot consisted of 95 pits of type (i), (ii) or (iii), 63 trenches of type (iv), or 45 trenches of type (v) and (vi).

The experiment was laid out on randomised block design with 6 replications. A mixture of seeds of *Acacia arabica*, *Prosopis spicigera*, *Tecoma undulata* and *Albizzia lebbek* in proportions of 150 seers, 30 seers, 8 seers and 40 seers, clean seeds was sown on July 15 and 16, keeping the seed rate constant.

(c) To compare the effect of different methods of soil working on establishment and growth of transplants.

This experiment was also laid out in compartment 5 at Pali. Effect of three different types of soil working on establishment and growth of three species viz. *Eucalyptus rostrata*, *Albizzia lebbek* and *Casuarina equisetifolia* is being compared. Experiment has been laid out on randomised block design.

The three types of soil working under investigation are:—

(i) 2' cube pits half filled with excavated weathered earth and with crescent shaped ridge across local slope to store water (i.e. Gcortype).

(ii) A bowl-shaped depression 3' across and 1' deep with 1' diameter planting pit at the bottom filled back with weathered earth.

(iii) 1' diameter and 2' deep planting pit encircled by a 1' deep and 1' wide trench inner and outer diameters of the trench being 3' and 5' respectively.

Planting pits were spaced 20' centre to centre and were staggered.

Nurseries

11. Besides the existing nine nurseries, two more, one each at Suratgarh and Jaitsar, were established during the year. The latter two were started to supply the planting stock for the forestry programme of the Central Mechanised Farm at Suratgarh. A total of 5,29,000 plants were available in all these nurseries.

12. In the Central nursery at Jodhpur, a shed to provide permanent shade to delicate species was constructed, and improved type of name plates were provided for each nursery bed. At the close of the year a total stock of about 2 lac plants of 230 species existed, of which 30 were indigenous, 99 from other regions of India and the remaining 101 raised from seed obtained from abroad.

About 58,500 plants were supplied from the Central Nursery for afforestation of the demonstration areas and road avenue planting, while over 8,500 plants were given to 37 government agencies, and about 3,750 plants were distributed to as many as 53 public agencies.

Total expenditure incurred on this nursery during the year was Rs. 15,125/- only.

13. The nursery at Gadra Road was maintained for supplying planting stock to border belt afforestation areas. Water for irrigation of the nursery stock was drawn from the railway well as in the previous year. On an average, about 2000 gallons a day in summer and 1000 gallons a day in winter were required for irrigation. Burial of barbed wire fencing by aeolian sands on the western side was prevented by erecting a brushwood fence on the outside and a little distance away from the wire fencing. Over 35,000 plants of different species were available in the nursery.

14. Water for irrigating the plants in Barmer nursery continued to be transported on camel back from the town. Further extension of the nursery area, though necessary, cannot be done as the available water is insufficient even for irrigating the existing stock. 5,000 plants were available in the nursery for road avenue planting, and for distribution to the public and other agencies.

From the above two nurseries 8,530 plants were utilised for departmental afforestation, about 1,000 were given to other government departments, and about 250 distributed to various public agencies.

15. The existing nurseries at Pali, Pokaran and Beriganga were maintained for supplying plants to afforestation areas and road avenue of Jodhpur Range. Growing stock consisted of about 59,000 plants in Pali nursery, 24,000 in Pokaran nursery, and about 28,000 in the nursery at Beriganga. Growing stock consisted mainly of *Prosopis juliflora*, *Azadirachta indica*, *Albizia lebbek*, *Ailanthus excelsa*, *Dalbergia sissoo* and a few others.

Over 48,000 plants were supplied from these three nurseries for planting in various afforestation demonstration areas of the Station.

16. As has already been said in para 12 above, the work of planting shelter-belts, road avenues and sand dune fixation etc. in the Central Mechanised Farm started at Suratgarh with Russian equipment in August, 1956 was entrusted to this Station. Though the rains had almost ceased by then, work of establishing the nurseries and raising sufficient planting stock to meet the requirements of 1957 planting season was taken up. Sites for the nurseries were selected at Suratgarh within the farm, and at Jaitsar outside it because of the availability of irrigation water near by. Nursery at Suratgarh was inaugurated by the General Manager of the Farm, Major General Mahadeo Singh, on 15th August, 1956, and the entire area of 9 acres was ploughed up with tractors and enclosed by a ditch 3'6" wide and 2'6" deep, excavated with the help of a ditcher hauled by a tractor. Beds were laid out. Enough sand and farmyard manure were added to improve the local heavy soil. *Albizzia lebbek*, *Dalbergia sissoo*, *Eucalyptus rostrata*, *Eucalyptus citriodora*, *Jacaranda ovalifolia*, *Azadirachta indica*, *Cassia siamea* papaya, lemon and Jatty-Khatty etc. were sown in beds and irrigated with water transported by bullock carts from a reservoir about a mile away. Existing growing stock consists of about 10,000 plants.

An expenditure of Rs. 2,520/- had been incurred up to the end of the year on this nursery.

Jaitsar nursery.—It occupies an area of 5 acres. Soil is heavy and had, therefore, to be improved by mixing sand and farmyard manure. Land was allotted only towards the end of August '56 and nursery works were started in September. As the sowing season was almost past, natural seedlings from under the sissoo and siris trees at Jaitsar and Sri Ganganagar were pricked out and transplanted in the nursery which remained unfenced for want of fencing material. Some other species were also raised by sowings and watering.

Irrigation water is available from Sarupsar minor by arrangements with Rajasthan Irrigation Department.

The present stock consists of about 60,000 healthy seedlings of 13 species. A sum of Rs. 2,916 has been spent on this nursery up to end of December.

17. Nurseries at Jhunjhunu, Chirawa and Sardarshahr were maintained primarily to raise enough plants for afforesting various demonstration areas and road avenues and also for distribution to public and other Government departments. Growing stock numbered over 32,000, 24,000 and 52,000 plants respectively in each of the above three nurseries and consisted mostly of species like *Prosopis juliflora*, *Azadirachta indica*, *Albizzia lebbek*, *Ailanthus excelsa*, *Tamarix articulata*, *Dalbergia sissoo*, *Moringa pterygosperma* and many other miscellaneous species. In Sardarshahr Nursery, fodder and other grasses like *Elionurus hirsutus*, *Panicum antidotale*, *Cenchrus ciliaris* and *Saccharum munja* were raised for planting on shifting sand dunes.

The nursery at Chirawa was fenced with angle iron posts and barbed wire and was also extended to cover a total area of about an acre. Live hedges of *Parkinsonia aculeata* and *Dodones viscosa* were raised to serve as wind breaks. Some shading frames and wire netting frames were provided to prevent delicate plants from frost, insolation and rodents.

In Sardarshahr nursery, a pucca water storage tank was constructed to provide irrigation water for the nursery in cases of failure of pumping equipment of Gandhi Vidya Mandir well.

Seed Store

18. The Station maintained a Central Seed Store at Jodhpur where large quantities of seeds of both grass and tree species were stored. Seed of different species were collected locally in various Ranges of the Station as well as obtained through Silviculturists of various States and from seed merchants. Seed in small quantities of a large number of tree, grass and shrub species considered suitable for arid zone were also received from various foreign countries *e.g.*, Australia, Israel, Chile, U.S.S.R., as given in Appendix III.

This stock was utilised for seeding the afforestation areas and nurseries and for supplying to various indenting agencies. Small quantities of some seeds were also sent on exchange basis to three nurseries in Australia.

19. The following statement shows the quantity of seed collected and expenditure involved :—

	Quantity collected						Expenditure incurred					
	Tree spp.			Grass spp.			Tree spp.			Grass spp.		
	Md.	Sr.	Ch.	Md.	Sr.	Ch.	Rs.	A.	P.	Rs.	A.	P.
Research Range	103	39	14				516	9	0			
Jodhpur Range	338	30	0	1	1	0	2331	0	0	52	8	0
Gadra Road Range	19	11	0	19	27	0	382	0	0	462	0	0
Jhunjhunu Range	89	0	6	2	23	8	795	12	0	75	8	0
TOTAL	551	1	4	23	11	8	4025	5	0	590	0	0

Creation of Oases of Vegetation

20. It was observed that large scale distribution of seeds not only does not serve the desired purpose but also results in a considerable waste of seeds. These were, therefore, distributed only to such agencies as put in their indent. No cost was charged for small quantities of seeds but collection, packing and freight were charged for large indents.

21. The Station supplied seeds of tree species free to such bodies as required them for creation of oases of vegetation around :—

- (i) Military and Air Force Headquarters,
- (ii) Rajasthan Armed Constabulary posts,
- (iii) Railway and Police Stations,
- (iv) Schools, Gram Panchayats and Co-operative Societies,
- (v) Private dwellings.

Planting of Road avenues

22. A length of 50 miles 3 furlongs of road avenues planted along various important highways of North Western Rajasthan during 1953 to 1955 was maintained by timely weeding, watering, replacement of casualties, fencing, soil working and protecting against the browsers.

23. Following statement shows the details of avenue planting programme for the above period :-

Year of planting	Name of Road	Mile Number		Total length planted up.
		From	To	
			mile	Furlongs
1953	Jodhpur—Pali	22/2	24/1	1 7
1954	1. Jodhpur—Pali	30/0	34/0	4 0
	2. Jodhpur—Pali	17/6	22/2	4 4
	3. Pali—Ajmer	91/0	95/0	4 0
	4. Jodhpur—Nagaur	6/4	8/7	2 3
	5. Sardarsamand—Marwar Junction	42/0	45/0	3 0
	6. Ratangarh—Sardarshahr	28/0	30/0	2 0
	7. Chirawa—Railway Station to Pali.	0/2	2/0	1 6
1955	1. Jodhpur—Nagaur	8/7	13/0	4 1
	2. Jodhpur—Pali	13/4	17/6	4 2
	3. Jodhpur—Pali	25/6	30/0	4 2
	4. Pali—Ajmer	63/0	65/0	2 0
	5. Pali—Ajmer	52/6	56/0	3 2
	6. Sardarsamand—Marwar Junction.	40/0	42/0	2 0
	7. Pokaran—Jaisalmer	0/0	2/0	2 0
	8. Barmer—Sheo	0/3	2/3	2 0
	9. Barmer—Sindri	0/0	2/0	2 0
	10. Ratangarh—Sardarshahr	27/0	28/0	1 0
TOTAL			50	3

24. The following lengths of roadsides were planted up during the year under report:—

1. Pali—Ajmer	70/4	74/4	4 0
2. Sardarsamand—Marwar Junction	35/0	40/0	5 0
3. Jodhpur—Nagaur	13/0	16/0	3 0
4. Pokaran—Jaisalmer	2/2	5/2	3 0
5. Barmer—Sheo	2/3	7/3	5 0
6. Barmer—Sindri	2/0	7/0	5 0
7. Chirawa—Khetri	17/0	23/0	6 0
8. Ratangarh—Sardarshahr	25/0	27/0	2 0
TOTAL		33	0

Termites and browsing were responsible for large number of casualties that occurred in some localities.

25. Planting was done in three rows on each side of the road. The first row comprised of species of shade trees like *Albizzia lebbek*, *Azadirachta indica*, *Dalbergia sissoo* and even *Prosopis juliflora* according to soil conditions. Outer two rows i.e., the second and third rows were planted with *Prosopis juliflora* only. Plants in the first row were pruned to prevent low branching that might cause obstruction to traffic. Sturdy and healthy potted plants of *Prosopis juliflora*, *Azadirachta indica* and *Dalbergia sissoo*, transplants without earth balls of *Albizzia lebbek* and sprouted potted stumps of *Prosopis juliflora* and branch cuttings of *Tamarix articulata* were used for planting. All the six rows of avenue plants are expected to develop into an effective shelter belt in course of time.

2' x 2' x 2' pits were dug in all the three rows for planting. Pits in the first row were encircled by 2' 6" deep trench with diameters of inner and outer periphery as 6' and 12' respectively. Earth excavated from this trench was piled along the outer periphery and *Prosopis juliflora* segments were sown on the ridge so formed to create a live fence around the plant. Additional protection against browsing damage was provided by erecting brushwood fencing around the plant. The first row was aligned at a distance of 25' from the centre of the road. The spacing of row to row on each side of the road was kept at 12½'. Pits in the first and second row were dug staggered at 33' interval, centre to centre, and in the outermost row at 16½' espacement. The soil of these pits was inoculated at the time of filling back.

Immobilisation of Shifting sands along Railway Tracks.

26. The work of sand binding by vegetation along railway tracks running through shifting sand tracts done during 1954 proved to be a great success. Railway authorities appreciated it very much and requests for its extension to cover other 'bad' portions, which constitute a total length of about 17,000 feet, were received from them.

27. It has been successfully demonstrated by past two years work that immobilisation of shifting sands by vegetation, besides being a permanent cure, is much cheaper than the recurring and delaying process of sand lifting from the burried track by manual labour. In addition, the vegetative cover would also yield revenue in due course through sale of grasses and wood.

28. Previous years works at Sikar and Palana were maintained. *Acacia arabica*, *Acacia senegal*, *Acacia jacquemontii*, *Prosopis spicigera*, *Prosopis juliflora*, *Tamarix articulata*, *Calligonum polygonoides*, *Albizia lebbek*, *Azadirachta indica*, *Zizyphus jujuba*, and *Saccharum munja* that had been sown and planted were all well established.

29. During the year 2,640 feet long strip along the track between telephone posts 148/10 to 148/19 on Loharu-Sikar line and 3,300 feet length near Palana between telephone posts 300/1 to 300/11 were taken up for such works. The efforts proved unsuccessful in the absence of a wooden pallisade along the periphery which could not be erected due to non-availability of rejected Railway sleepers.

Experimental Afforestation

I. AFFORESTATION OF ROCKY AREAS:

(i) Kailana (About 9 miles west of Jodhpur):

30. 1953 plantations—compartment 1 (80 acres).—Further efforts were made to stock up the failed patches of this compartment by planting out at the break of monsoon, about 3,500 potted plants of *Albizia lebbek*, *Prosopis spicigera*, *Zizyphus jujuba*, *Cordia rothii* and sprouted stumps of *Prosopis juliflora*. Only a fair percentage of *Prosopis spicigera* stumps and *Acacia senegal* seedlings were surviving in the area, other species failed to survive. As a result of closure good cover of grasses has been established and better grasses have started replacing the early colonisers like *Aristida* and *Eragrostis* spp.

Selective weeding was done and roads and paths were maintained. An amount of Rs. 328/8/- was spent during the year bringing the total amount spent on the area since its formation to Rs. 22,996/-.

31. 1954 plantations compartment 2 (130 acres).—Failures of last two years were replaced by planting potted seedlings and sprouted stumps of the same species as mentioned for comppt. 1 above. Termites and rats damaged quite a few plants.

Selective weeding was done and inspection roads and fence were maintained. An amount of Rs. 355/12/- was spent making the total sum spent since formation as Rs. 19,662/-.

32. 1955 plantations compartment 3 (106 acres).—Casualties of previous year were replaced with potted planting stock of species enumerated in above two paragraphs. Works of weedings, maintenance of inspection paths and fencing were done. An amount of Rs. 520/10/- was spent during the year. Total amount spent on the area was Rs. 6,999.

(ii) Beriganga (about 9 miles to north of Jodhpur).

33. 1954 plantation compartment 1 (100 acres).—Potted sprouted stumps of *Prosopis juliflora* were replanted in failed patches of the area. Selective weedings were carried out and inspection motor roads and fencing were maintained. *Prosopis juliflora* stumps and seedlings of *Prosopis spicigera* and *Acacia arabica* were doing well. A sum of Rs. 426/4/- was spent. Total amount spent since formation came to Rs. 23,073/-.

34. 1955 plantation, compartment 2 (280 acres).—About 1400 rft. gap in the fence of this compartment, which could not be completely fenced in the previous year, was fenced with barbed wire and stone posts. Casualties of last year were repaired and maintained. Selective weeding and watering of plants was done. Rs. 948/12/- was spent.

(iii) Plantations of 1956

35. Kailana compartment 4 (100 acres).—The area was fenced with stone posts and 5 strands of barbed wire. $2' \times 2' \times 2'$ pits were dug at $20' \times 20'$ spacing wherever depth of soil was enough. Exposed rock was left as such. 11,000 pits were so dug during April-May. These were half filled with excavated earth and a crescent shaped ridge running across local slope was formed on each pit. A mixture of seeds of *Prosopis juliflora*, *Prosopis spicigera*, *Acacia senegal* and *Tecoma undulata* was sown on the ridges before break of rains. Planting with potted nursery stock was done from July 3, onwards after rains had set in. 7,000 sprouted stumps of *Prosopis juliflora*, 250 plants of *Azadirachta indica*, 300 sprouted branch cuttings of *Tamarix articulata*, 500 plants of *Parkinsonia aculeata*, *Tecoma undulata*, and transplants of *Prosopis juliflora* were used.

A long rainless spell during September and termites caused mortality particularly in *Prosopis juliflora* plants.

Rs. 5,747/8/- was spent on the formation of this area.

36. Beriganga compartment 3 (200 acres).—The area was fenced with stone posts and 5 strands of barbed wire. 18" cube pits at $20' \times 20'$ staggered spacing were dug and filled back so as to form pits with crescent shaped ridges. 11,700 pits were dug. The crescent shaped ridges were seeded before break of rains with a mixture of *Prosopis juliflora*, *Prosopis spicigera*, *Acacia senegal*, *Tecoma undulata*, *Ailanthus excelsa* and *Acacia leucophloea*.

Sprouted stumps of *Prosopis juliflora*, and potted plants of *Tecoma undulata*, *Albizia amara*, *Casuarina equisetifolia*, *Cassiasimea*, *Ailanthus excelsa*, *Dalbergia sissoo*, *Acacia cyanophylla*, *Moringa pterygosperma*, *Inga dulcis*, *Erythrina indica*, *Bauhinia rosea*, *Zizyphus jujuba* and *Pongamia glabra* were planted on the break of rains.

Selective weeding and soil working were done as per requirement of the plants. Inspection roads were laid out and maintained.

An amount of Rs. 4,662/12/- was spent on its formation.

II. IMPROVEMENT AND AFFORESTATION OF GRAZING LANDS:

(i) Pali.—

37. 1953 plantations in compartment 1 (70 acres) and 1954 plantations in compartment 2 (111 acres) and 3 (149 acres).—Selective weeding and hoeing around seedlings were carried out during rains. Side branches of saplings in compartment 1 were pruned to assist in clean hole development. Failed patches of compmts. 2 and 3 were reseeded just before the break of rains. Growth of *Acacia arabica* plants is very variable in these areas.

38. 1955 plantations in Pali compartment 4 (222 acres).—Failed patches were resown before break of monsoon and weeding was carried out as and when required. Inspection roads and fence were maintained in good repairs. Plants of *Eucalyptus rostrata*, *Albizzia amara*, *Albizzia odoratissima*, *Kigelia pinnata*, *Azadirachta indica*, *Albizzia lebbek*, *Ailanthus excelsa*, *Butea monosperma*, *Holoptelea integrifolia* and *Cassia siamea* were doing well while *Bauhinia racemosa*, *Casuarina cunninghamia*, *Casuarina equisetifolia*, *Feronia elephantum*, *Eucalyptus citriodora*, *Tamarix articulata*, *Erythrina indica*, *Bombax malabaricum* and *Eucalyptus rudis* were poor both in growth and survival. Growth of *Acacia arabica* seedlings raised from sowing on ridges is very satisfactory.

39. (ii) 1954 plantations in Narhad compartment 1 (76 acres).—In about 40 acres of the area where sowings were done in trenches 6' × 18" × 18", *Prosopis juliflora*, *Acacia arabica*, and *Prosopis spicigera* have now got established. Plants of the former two species have grown 8'-10' tall and of the latter 2'-4' high and are healthy. In the other half of the area which had been ploughed up, good fodder grasses like *Eleusine spp.*, *Cenchrus ciliaris*, *Cenchrus setigerus*, *Dichanthium annulatum* and *Panicum antidotale* have come up quite dense.

About 2,000 mds. of fodder grasses was harvested in 1955 and approximately 3,000 mds. in 1956.

40. (iii) 1956 plantations—Pali compartment 5 (209 acres).—An area of 388 acres was fenced with angle iron posts and 5 strands of barbed wire. 209 acres out of this fenced area was taken up for afforestation during the year under report. This was further divided into 4 sections for control and ease of working.

In section 1, experiment described under paragraph 10(b) was laid out.

Part of section 2, was occupied by Plant Introduction Experiment described under paragraph 7. Rest of the area of this section was planted up with various species in pits with crescent shaped ridges. On ridges *Acacia arabica* and *Prosopis spicigera* seeds were sown. Plants were kept weeded. Watering and soil working for aeration were also carried out.

Section 3 was ploughed up with mould board plough hauled by tractor. Strips 24' wide, spaced at 66' intervals and running in North-South direction were demarcated. Three furrows were made in each strip at 12' intervals with the help of tractor hauled tracer. Outer two furrows of each strip were sown with seeds of *Acacia arabica* and the central furrows were sown with seeds of one or the other of the following species:—

Prosopis spicigera, *Albizzia lebbek*, *Azadirachta indica*, *Acacia leucophloea*, and *Tecoma undulata*.—These strips were planted to establish wind breaks.

Sod planting of *Panicum antidotale* was done in two inter-spaces between the strips.

Part of section 4 was occupied by the soil working experiment mentioned in paragraph 10(c). The rest of the area was ploughed up in strips 24' wide and at intervals of 66 feet and running in north south direction. Three furrow lines were made in each strip with the tractor-drawn tracer and sowing of seeds done as described for section 3 above.

Albizzia lebbek, *Acacia arabica*, *Acacia leucophloea* and *Prosopis spicigera* germinated well and growth of the seedlings is satisfactory. A total amount of Rs. 8,707 was spent on the plantations.

III. FIXATION OF SHIFTING SANDS BY MEANS OF VEGETATION:

(i) Sardarshahr

41. 1953 plantations in compartment 1 (75 acres).—The shifting sand dunes in the area are now practically fixed. Out of the various tree, shrub and grass species planted, *Prosopis juliflora*, *Tamarix articulata*, *Prosopis spicigera*, *Ricinus communis*, *Calligonum polygonoides*, *Saccharum munja*, *Elionurus hirsutus* and *Cymbopogon jwarancusha* are faring well. Thorn fencing was repaired and brick plants of *Prosopis juliflora* were put in failed patches. *Ricinus communis* seeds were sown along the fencing.

42. 1954 plantations in compartment 2 (86 acres).—Thorn fencing had to be repaired as and when it got buried under wind blown sands. In addition to the species mentioned for compartment 1 above, plants of *Tecoma undulata*, *Ailanthus excelsa*, *Azadirachta indica* and *Zizyphus jujuba* are growing successfully.

43. 1955 plantations in compartment 3 (55 acres).—Thorn fencing was repaired and *Prosopis juliflora* was sown along the periphery to form a live hedge in due course. More plants were put in the wind break strips to replace the casualties. *Prosopis juliflora*, *Tamarix articulata*, *Zizyphus jujuba*, *Albizzia lebbek*, *Moringa pterygosperma*, *Tecoma undulata*, *Acacia senegal* and *Prosopis spicigera* amongst tree species and *Elionurus hirsutus*, *Panicum antidotale* and *Saccharum munja* from the grasses sown and planted are doing well in patches.

(ii) Jhunjhumu.

44. 1953 plantations compartment 1 (70 acres).—The shifting sands have been completely immobilised. Most of the trees have grown 8' to 12' high and are quite healthy. The area requires protection against grazing for a few more years.

45. 1954 plantations compartment 2 (112 acres).—The tree, shrub and grass species planted on these mobile sands in 1954 were well established. *Cordia rothii*, *Tamarix articulata*, *Dalbergia sissoo*, *Acacia arabica*, *Ailanthus excelsa*, *Prosopis spicigera*, *Prosopis juliflora*, *Acacia senegal*, *Zizyphus jujuba*, *Albizzia lebbek*, *Calligonum polygonoides*, *Cassia auriculata*, *Panicum antidotale*, *P. turgidum*, *Elionurus hirsutus* and *Saccharum munja*, all were doing well. *Saccharum spontaneum* is propagating itself each year.

During the year fencing etc. was kept repaired and some tree species were pruned.

46. 1955 plantations compartment 3 (51 acres).—As the area is situated near habitation it was very difficult to keep people and cattle out and lot of damage from these sources was suffered by plants. Fencing was kept repaired and *Prosopis juliflora* seed was sown along the periphery to create a live hedge. Almost the same species as were used for planting comp. 2, were planted in this compartment. They have put up good growth.

(iii) Churu

47. 1954 and 1955 plantations compartments 1 (20 acres) and 2 (8 acres).—Both these areas were fenced with angle iron and barbed wire fencing during the year. The shifting sands within these compartments were more or less stabilised with *Prosopis juliflora*, *Prosopis spicigera*, *Tamarix articulata*, *Acacia senegal*, *Acacia jaca quemontii*, *Zizyphus jujuba*, *Calligonum polygonoides* and *Saccharum munja* growing very well.

(iv) Narhad

48. 1955 plantations compartment 2 (70 acres).—*Tamarix articulata* and brick plants of *Prosopis juliflora* have put on excellent growth while *Ailanthus excelsa*, *Cordia myxa*, *Nim*, *Albizzia lebbek*, *Tecoma undulata*, *Saccharum munja*, *Panicum antidotale*, *Elionurus hirsutus* and *Cenchrus ciliaris* have done very well. Deer and blue bulls were damaging plants by browsing. Thorn fencing was not effective in keeping out cattle and some damage occurred from that source also.

(v) 1956 plantations

49. Narhad compartment 3 (70 acres).—Fencing of the area with angle iron posts and barbed wire could not be completed for want of adequate quantities of fencing material. Sod planting of *Panicum antidotale* was done over part of the area. Brick plants and transplants of *Tamarix articulata*, *Prosopis juliflora*, *Acacia arabica*, *Albizzia lebbek*, *Tecoma undulata*, *Ailanthus excelsa*, *Prosopis spicigera* etc. were planted in strips 60' wide and 240 feet apart. Brick plants were doing well. Termites and deer have done a lot of damage to the plants.

50. Jhunjhunu compartment 4 sections A and B (50 acres).—Section A: The area comprised of the shifting sand dunes between District Courts and Officers' bungalows which were seriously threatened by sand invasion. As the fencing material was not available, planting of *Prosopis juliflora*, *Ailanthus excelsa* and *Albizzia lebbek* at 15' × 15' spacing met with failure. Only a few clumps of *saccharum munja* planted along with above mentioned tree species were surviving.

Section B: The area which is situated to the north of comp. 1 and 2 was fenced with angle iron and barbed wire. Various tree species mentioned for comp. 3 at Narhad and *Eucalyptus rostrata* were planted in 60' wide strips at 200' espacement. *Prosopis juliflora* and *Tamarix articulata* plants were growing well. Termites caused heavy damage to all plants and particularly *Eucalyptus rostrata*.

Panicum antidotale, *Elionurus hirsutus* and *Saccharum munja* were planted in between the strips and were faring well.

51. *Sardarshahr compartment 4* (68 acres).—Sections of the periphery passing over consolidated soil were fenced with angle iron and barbed wire and those passing through shifting sands were fenced with brushwood. On brushwood barriers were erected along the crests of the dunes as also on the slopes of the dunes at 10'-12' spacing. Castor seed was sown and *Prosopis juliflora* planted along the periphery. In the deforests in between the dunes where soil was free from sands, 2' cube pits half filled with excavated earth and provided with crescent shaped ridges to collect precipitation were dug. Miscellaneous species like *Zizyphus jujuba*, *Prosopis juliflora*, *Prosopis spicigera*, *Tecoma undulata*, *Tamarix articulata* etc. were planted and *Acacia arbica* seeds were sown on the ridge. The sowings failed completely but *Prosopis juliflora*, *Tamarix articulata* and *Zizyphus jujuba* plants were growing well.

Seeds of *Siris*, *Acacia arabica*, *Acacia senegal*, *ber*, *Prosopis juliflora*, *Prosopis spicigera*, *phog*, *castor* etc. were sown along the lines of 'mulching' (low brushwood barriers). *Acacia senegal*, *Prosopis spicigera*, *Castor* and 'ber' were growing well. *Elinurus hirsutus*, *Panicum antidotale*, *Panicum turgidum*, *Cenchrus ciliaris*, *Eleusine flagelligera*, *Saccharum munja* etc. were sown and planted and most of them were doing well.

Five strips each 60' wide running north-south, were laid at 240' intervals and planted up with tree species in rows 15' apart to serve as wind breaks later on. The experiment mentioned in paragraph 7 was laid in two of these strips.

Deer were reported to have done considerable damage to plants in this compartment.

Border-Belt

52. *Demarcation*.—Work of permanent demarcation of the 36 sq. mile 'belt' near Indo-Pak border with stone posts was completed in March.

In spite of the best efforts of the local staff, the 'belt' area could not be protected effectively against grazing by villagers cattle. Advantage was taken of the various cattle pounds established near the 'belt' area during the year and trespassers were led to these pounds. But this caused resentment amongst the local villagers who are against any control on their grazing habits. Touring officers of the Station tried to educate them on the point. Rajasthan Government has been moved to declare the area as 'Reserved Forest' so that Rajasthan Forest Act could be made applicable to it.

53. Initially, it was planned to create a 5-mile shelter-belt running parallel to the Western Indo-Pak border and steps to acquire the necessary strip of land for the purpose were taken, and a strip of 36 square miles was acquired. Later on, on the recommendation of the F.A.O. Expert, Dr. Goor, who studied the problem, the project was given up and no further land was acquired.

54. The acquired area was utilised for pasture improvement by controlling grazing. Taking advantage of fencing with barbed wire of about 2 square mile area situated about 8 miles North-east of Gadra Road, by Rajasthan Forest Department for aerial sowing experiment, programme of afforestation was started in this area in 1955. It was continued during the year under report. Casualties in 1955 plantations were replaced immediately after the break of monsoon. A total of 1600 potted plants of *Azadirachta indica*, *Albizia lebbek* and *Tecoma undulata*, and sprouted stumps as also plants of *Prosopis juliflora* and *Pithecolobium dulce* were used.

55. 290 acres was taken up for afforestation this year bringing the total to 840 acres. The scheme of soil working, alignment of plantation strips etc. was the same as adopted last year. Two strips, running North to South and a quarter mile apart were laid. In each strip three rows of pits 2 feet cubed were dug during March-April. Pits in the three rows staggered and 15' apart. A little gammaxene powder was mixed with excavated earth and the pits were half filled with this, making at the same time a crescent shaped ridge across the local slope to catch runoff. A mixture of the seeds of *Salvadora oleoides*, *Acacia senegal*, *Calotropis procera* *Prosopis spicigera*, *Zizyphus jujuba*, *Acacia arabica*, *Cassia auriculata*, *Prosopis juliflora* and *Belanites roxburghii* was sown in June before break of rains on these crescent shaped ridges. Castor seed was also sown on these ridges as also along the periphery of the area where tractor had worked up the soil. A total weight of 17 mds. of seeds was used. After break of monsoons potted plants of *Azadirachta indica* and *Albizia lebbek* and sprouted stumps of *Prosopis juliflora* were put in the pits. Out of about a thousand plants thus put in, a few died due to termite attack. First weeding was carried out in August and second in the month of September.

56. Attempts to afforest 130 acre area near Girab in 1954 and 1955 have met with scanty success. Sowings and plantings were again carried out in this area during this year. 280 pits with crescent shaped catch-water ridge were dug during March-April and sprouted stumps of *Prosopis juliflora* transported on camel back from Gadra Road were planted at the break of monsoon. A mixture of seeds of species like *Prosopis juliflora*, *Prosopis spicigera*, *Salvadora oleoides*, *Acacia arabica*, *Cassia auriculata*, and *Balanites roxburghii* was also sown. On the whole the prospects for successful afforestation of the area are not very bright. However, quite a number of *Acacia arabica* seedlings from previous year's sowing are surviving and growing well.

Study tours of officer trainees and students of forestry schools and Colleges

57. The following trainees visited various afforestation areas, experiments and nurseries in the course of their educational tours during the year:—

- (i) Two batches of soil Conservation trainees from Soil Conservation Centre, Kotah.
- (ii) Soil Conservation Trainees from Soil Conservation Centre, Ootacamund.
- (iii) Officer trainees from Soil Conservation Centre, Dehra Dun.
- (iv) Junior A Section of the Indian Forest College, Dehra Dun.
- (v) Forester's Class of Rajasthan Forest School, Alwar.

Study tours of the officers of this Station

58. Shri S. Pathak, Junior Research Officer, was deputed for about a week to the Indian Agricultural Research Institute, New Delhi during February for studying agrostological experiments. He was deputed by the Soil Conservation Board to carry out the Reconnaissance Survey of Lower Kosi Catchment in Nepal during May and part of June. He also spent about a week during August at the Forest Research Institute, Dehra Dun consulting the Central Silviculturist about layout of various proposed experiments.

Shri R. B. Das, Research Assistant, spent 6 months in Australia studying problems of arid zone pasture research under a fellowship awarded to him by UNESCO.

Publicity

59. *Paper and articles.*—The following articles and papers were written by various officers of the Station:—

- (i) A note on the activities and progress of the Station by Shri Mahendra Prakash, Senior Research Officer sent to Directorate of Public Relations, Rajasthan Government and published in the brochure 7th Van Mahotsava.
- (ii) A brochure 'Soil Conservation in Rajasthan Desert' by the Ministry of Food and Agriculture, New Delhi.
- (iii) Nursery Practices for Arid Zone—West Rajasthan by Shri S. Pathak, Junior Research Officer.
- (iv) 'Arid zone afforestation—Problems and Technique' by Shri Mahendra Prakash, Senior Research Officer.
- (v) 'Brick-planting' by Sarvashri S. Pathak and Mahendra Prakash.

60. *Lectures and talks.*—Shri Mahendra Prakash, Senior Research Officer delivered the following lectures and talks:—

- (i) Two lectures on 'Benefits from Forestry' and 'Fight against the Desert' to final year students of Engineering College, Jodhpur and 500 Jawans of N.V.F. Camp, Barmer.
- (ii) Tape recording in Hindi about the works done by the Station for use by 5 year Plan Field Publicity Officer at fairs, gatherings etc.
- (iii) A talk on 'Immobilisation of sands' to Soil Conservation Trainees from Kotah.

Photographs and movie films of the various activities of the Station were taken and displayed to various audiences, particularly during the joint August tour undertaken by Shri Mahendra Prakash and the Field Publicity Officer of the Ministry of Information and Broadcasting, when the former also lectured at various schools and colleges.

61. *Exhibitions.*—(i) The 'UNESCO' exhibiton of 'Man Against the Desert' charts and posters was held at Jaipur, Jodhpur and Ajmer.

(ii) Posters, charts and potted plants of desert loving species were displayed at the Five Year Plan exhibition at Jodhpur Jaipur and Barmer.

62. *Press publicity.*—Members of the Press Club, Jodhpur were shown round the Jodhpur Nursery and Afforestation areas.

Administration

63. Shri G. S. Lamba, Chief Research Officer retired from this Station with effect from 1-9-1956.

Shri S. Pathak, took over charge from Shri O. N. Kaul as Junior Research Officer from 27-1-56.

Post of Head Clerk was converted to that of Superintendent and Shri M. S. Killadari, Head Clerk, was promoted to the post of Superintendent with effect from 22-12-56. A post of Accountant-cum-Cashier was also created and Shri Dashrath Mal Mehta was appointed to it. Shri Dalulat Ram Khemani, Lower Division Clerk was promoted to the post of Upper Division Clerk with effect from 12-9-56.

Shri Muni Lal, a retired Forest Ranger of Punjab Forest Department was appointed as Forest Ranger and joined with effect from 4-2-56.

Out of 12 Foresters, there were only 5 trained ones, 2 more Foresters were sent for training to Shivpuri Forest School, Shivpuri, M.P., during the year.

64. A Statement showing the staff sanctioned under the reorganised scheme for the Station is as follows:—

Sl. No.	Designation of post	No of post	Scale of pay
1	Chief Research Officer	1	1000—50—1400
2	Soil Conservation Officer (Agronomy)	1	600—40—1000—1000 1050—1050—1100—1100—1150
3	Soil Conservation Officer (Agrostology)	1	Do.
4	Soil Conservation Officer (Silviculture)	1	600—40—1000—1000—1050— 1050—1100—1100—1150.
5	Administrative Officer	1	275—25—500—30—650 E. B. 30—800
(B) Technical Non-gazetted			
6	Research Assistant Class III	3	160—10—330
7	Surveyor Draftsman Class III.	1	100—5—125—6—155—E. B. 6—185
8	Store Keeper Class III	1	60—3—81 E.B. 4—125—5—130
9	Store Attendant Class IV	1	30— $\frac{1}{2}$ —35
10	Light Tractor Driver Class III	1	60—75.
11	Cleaner Class IV	1	30— $\frac{1}{2}$ —35
12	Fieldmen Class III	3	60—4—120 E.B. 5—150
13	Drivers (Jeep) Class III.	2	60—5/2—75
(C) Office staff			
14	Superintendent Class II	1	250—15—400
15	Accountant-cum Cashier Class III	1	80—5—120—8—200—10/2—220
16	U.D.C. Class III	3	Do
17	L.D.C. Class III	6	60—3—81—E.B. 4—125—5—130
18	Daftri Class IV	1	35—1—50
19	Peons Class IV	6	30— $\frac{1}{2}$ —35
20	Chowkidars Class IV	2	30— $\frac{1}{2}$ —35
21	Sweeper Class IV	1	30— $\frac{1}{2}$ —35
(D) Staff at units			
22	Soil Cons. Asstts	5	250—10—300—15—450—25/2— 500
23	L.D.C. Class III	5	60—3—81—E.B. 4—125—5— 130
24	Drivers (including Truck driver.) Class III	3	60—5/2—75
25	Fieldman Class III	10	60—4—120—E.B. 5—150
26	Forest Guards Class IV	30	30— $\frac{1}{2}$ —35
27	Chowkidars Class IV	20	30— $\frac{1}{2}$ —35
28	Peons Class IV	5	30— $\frac{1}{2}$ —35

The following existing posts at the Desert Afforestation Research Station, Jodhpur were re-designated as shown against each under reorganised set up:—

Sl. No.	Designation at present	Revised designation
(i)	Senior Research Officer	Soil Conservation Officer. (Silviculture)
(ii)	Forest Ranger	Research Assistant.
(iii)	Head Guard.	Fieldman.
(iv)	Forest Guard	Forest Guard/Chowkidar.

The Chief Research Officer will be the Head of this new organisation and will exercise all the powers already delegated to him.

65. *Expenditure*.—Tabular statement forming Appendix IV gives the figures of annual expenditure under various accounts sub-heads from the date of establishment of the Station up to end of December, 1956.

Visitors

66. The following distinguished persons visited the Station during the period under report:—

1. Shri V. K. Sud, I.A.S., Collector, Nagpur.
2. Shri K. P. U. Menon, I.A.S., Collector, Pali.
3. Prof. Mc. Mahon of Australia.
4. Mr. Jan Eshuis of Holland, F.A.O. Expert for Sheep and Wool Development Schemes.
5. Mr. Mc. Currie, F.A.O. Expert in Forestry in Pakistan.
6. Shri N. N. Sen, I.F.S., Chief Conservator of Forests, Rajasthan.
7. Shri K. M. Munshi, Governor of U.P.
8. Shri Amrit Lal Yadav, Ministry for Forests, Rajasthan.
9. Shri Khet Singh, Dy. Minister of Forest, Rajasthan.
10. Shri Bijay Singh, M.P.
11. Shri D. C. Kaith, Director, Soil Conservation Board, (Forests) Ministry of Agriculture, New Delhi.
12. Dr. J. K. Basu, Director of Soil Conservation Board (Agri.) Ministry of Agriculture, New Delhi.
13. Dr. R. S. Gupta, Soil Conservation Officer, Dehra Dun with trainees.
14. Shri K. M. Mehta, Soil Conservation Officer, Vasad.
15. Shri Dhabadghao, Ecologist, Grassland Survey Party, I.C.A.R. and grassland survey officers.
16. Shri G. G. Takle, I.F.S., Inspector General of Forests.
17. Dr. Mathur, Dy. Adviser Intensive Cultivation, Ministry of Food and Agriculture.
18. Mr. W. F. B. Price, Asstt. Trade Commissioner, U.K.
19. Col. Tandon, A.D.M.E., Head quarters, Delhi.
20. Mr. Hedge, T.C.M. Expert to Government of India.
21. Asstt. Director, Meteorological Department, New Delhi.
22. Mr. Kanwar Sain, Chairman, Central Water Power Commission.

General

67. On the recommendations of Dr. A.Y. Goor, Conservator of Forests, Israel, F.A.O. Expert on Arid zones, the Government sanctioned the reorganisation of this Station and the name of this Station was altered to 'Desert Afforestation & Soil Conservation Station, Jodhpur'. According to this reorganised scheme the station will have its own office building and laboratories and residential quarters for some of the staff.

In addition to the Central Research Station at Headquarters, there will be 5 units (Barmer, Jodhpur, Jaisalmer, Bikaner and Jhunjhunu, instead of 3 Ranges that were there till now.

APPENDIX I

S. No.	Name of species	Source of	Date of sowing	Germination %	Plant %	Height of the shoot on 25-12-56
1	<i>Acacia cyanophylla</i>	Israel	24-8-56	64	50	6"
2	<i>Acacia ligulata</i>	"	19-8-56	4	..	..
3	<i>Acacia melanoxylon</i>	"	24-8-56	61	40	2"
4	<i>Acacia raddiana</i>	"	27-9-56	12	..	3"
5	<i>Acacia saligna</i>	"	27-9-56	Seed did not germinate.		
6	<i>Acacia spirocarpa</i>	"	27-9-56	42	..	2"
7	<i>Ailanthus glandulosa</i>	"	14-9-56	46	..	3½"
8	<i>Brachychiton populneum</i>	"	24-8-56	32	28	3"
9	<i>Cesalpinia crevifolia</i>	"	27-9-56	36	..	..
10	<i>Casuarina equisetifolia</i>	"	31-8-56	57	42	4"
11	<i>Cercis siliquastrum</i>	"	17-9-56	Seed did not germinate		
12	<i>Celtris australis</i>	"	17-7-56	50	..	6"
13	<i>Ceratonia siliqua</i>	"	17-7-56	36	..	3"
14	<i>Crataegus asorolus</i>	"	27-9-56	Seed did not germinate		
15	<i>Cupressus arizonica</i>	"	24-8-56	12	..	..
16	<i>Cupressus Macrocarpa</i>	"	1-9-56	Seed are germinating now		
17	<i>Cupressus sempervirens</i> var <i>Horizontalis</i>	"	24-8-56	Seed are germinating now		
18	<i>Cupressus sempervirens</i> var. <i>pyramidalis</i>	"	24-8-56	Seed are germinating now		
19	<i>Eucalyptus albens</i>	"	24-8-56	..	95	3½"
20	<i>Eucalyptus camaldulensis</i>	"	24-8-56	52	60	1"
21	<i>Eucalyptus gomphocephala</i>	"	24-8-56	43	65	1'3"
22	<i>Eucalyptus hemiphloia</i>	"	24-8-56	43	39	3"
23	<i>Eucalyptus intertexta</i>	"	24-8-56	5	..	2"
24	<i>Eucalyptus occidentalis</i>	"	24-8-56	53	..	4"
25	<i>Eucalyptus robusta</i>	"	24-8-56	89	80	3½"
26	<i>Eucalyptus rudis</i>	"	24-8-56	79	..	5"
27	<i>Eucalyptus sidroxylon</i>	"	24-8-56	47	..	3"
28	<i>Eucalyptus tereticornis</i>	"	24-8-56	31	..	1'
29	<i>Haloxylon persicum</i>	"	31-8-56	Seed did not germinate.		
30	<i>Parkinsonia aculeata</i>	"	17-9-56	17	93	10"
31	<i>Prosopis chilensis</i>	"	31-8-56	27	90	10"
32	<i>Prosopis siliquastrum</i>	"	31-8-56	46	29	1'
33	<i>Prosopis tamrugo</i>	"	30-10-56	15	..	1"
34	<i>Pistacia atlantica</i>	"	16-9-56	Seed did not germinate.		
35	<i>Pinus brutia</i>	"	24-8-56	3	..	..
36	<i>Retama roetam</i>	"	17-9-56	15	..	4"
37	<i>Rhus corieria</i>	"	24-8-56	Seed did not germinate.		
38	<i>Schinus terebinthifolia</i>	"	24-8-56	62	79	5"
39	<i>Schinus molle</i>	"	24-8-56	Seed did not germinate.		
40	<i>Zizyphus spinachristi</i>	"	17-7-56	58	..	1'2"

APENDIX I—Contd.

S. N.	Name of species	Source of	Date of sowing	Germination %	Plant %	Height of the shoot on 25-12-56
41	Acacia cyclopis . . .	Australia	24-8-56	33	..	4"
42	Acacia cynophylla . . .	"	1-9-56	23	..	3"
43	Acacia continua . . .	"	30-10-46	1	..	..
44	Acacia glandiformis . . .	"		Seed did not germinate.		
45	Acacia loderi . . .	"	30-11-56	Seed did not germinate.		
46	Acacia notabilis . . .	"	30-10-56	Seed did not germinate.		
47	Acacia oswaldii . . .	"	30-10-56	60	..	3"
48	Acacia peuce . . .	"	30-10-56	Seed did not germinate.		
49	Acacia sowdeni . . .	"	30-10-56	4	..	2"
50	Brachychiton populneum . . .	"	24-8-56	Seed did not germinate.		
51	Callitris glauca . . .	"	24-8-56	Seed did not germinate.		
52	Callistemon rigidus . . .	"	24-8-56	Seed did not germinate.		
53	Eucalyptus albens . . .	"	1-9-56	70	90	4"
54	Eucalyptus camaldulensis . . .	"	1-9-56	28	76	2"
55	Eucalyptus cornuta . . .	"	1-9-56	75	..	..
56	Eucalyptus crebra . . .	"	1-9-56	75	..	..
57	Eucalyptus diversicolor . . .	"	1-9-56	92	85	10"
58	Eucalyptus gomphocephala . . .	"	1-9-56	67	59	4"
59	Eucalyptus melanophloia . . .	"	1-9-56	..	..	1½"
60	Eucalyptus resinifera . . .	"	1-9-56	79	..	2½"
61	Eucalyptus robusta . . .	"	1-9-56	83	..	6"
62	Eucalyptus rudis . . .	"	1-9-56	68	..	2"
63	Eucalyptus saligna . . .	"	24-8-56	47	..	1½"
64	Eucalyptus terminalis . . .	"	1-9-56	50	..	1"
65	Eucalyptus tereticornis . . .	"	1-9-56	49	..	2"
66	Calligonu setosum . . .	U.S.S.R.	28-9-56	19	..	4"
67	Calligonum turkestanicum . . .	"	28-9-56	Seed did not germinate.		
68	Calligonum arborescens . . .	"	28-9-56	48	90	1'3"
69	Calligonum eriopodum . . .	"	28-9-56	79	..	..
70	Calligonum peletzianum . . .	"	28-9-56	73	..	..
71	Calligonum capist . . .	"	28-9-56	48	100	1'3"
72	Ehodra strobilaceae . . .	"	9-10-56	49	35	5"
73	Salsola richteri . . .	"		Seed did not germinate.		
74	Salsola peletziana . . .	"		Seed did not germinate.		
75	Haloxylon persicum . . .	"	9-10-56	Seed did not germinate.		
76	Acacia cavenia . . .	Chile	8-10-56	10	..	..
77	Cassia coquimbensis . . .	"	8-10-56	4	..	4"
78	Cordia decondra . . .	"	8-10-56	Seed did not germinate.		
79	Kagenechia oblonga . . .	"	8-10-56	24	..	2"
80	Lithraea caustica . . .	"	8-10-56	28	..	2"
81	Maytenus boaria . . .	"	8-10-56	37	..	2"
82	Porlieria chilensis . . .	"	8-10-56	20	..	5"
83	Schinus molle . . .	"	8-10-56	73	..	3"

APPENDIX II

Statement showing survival percentage on 15-9-56 by species of Experimental Plot at Beriganga and Pali

Serial No.	Name of species	Beriganga			Pali		
		Out of 60 plants, number of surviving on 15-9-56	Survival percentage on 15-9-56	Survival percentage on 31-12-55	Out of 60 plants, number of surviving on 15-9-56	Survival percentage on 15-9-56	Survival percentage on 31-12-55
1	2	3	4	5	6	7	8
1	<i>Albizzia odoratissima</i>	45	75	100	50	83.3	98.3
2	<i>Albizzia lebbek</i>	30	50	100	21	35	78.3
3	<i>Albizzia amara</i>	60	100	100	60	100	100
4	<i>Allanthus excelsa</i>	39	65	100	38	68.3	80
5	<i>Azadirachta indica</i>	60	100	100	53	88.3	93.3
6	<i>Butea monosperma</i>	48	80	100	34	56.6	98.3
7	<i>Bauhinia racemosa</i>	6	10	30	3	5	5
8	<i>Cassia siamea</i>	20	33	100	30	50	100
9	<i>Casuarina equisetifolia</i>	2	3	50	24	40	100
10	<i>Casuarina cunninghamia</i>	25	42	100	34	56.6	100
11	<i>Eucalyptus rudis</i>	6	10	60	34	56.6	100
12	<i>Eucalyptus rostrata</i>	28	47	85	55	91.6	96.6
13	<i>Eucalyptus citriodora</i>	1	1	50	7	11.6	56.6
14	<i>Feronia elephantum</i>	55	92	100	57	61.6	100
15	<i>Holoptelea integrifolia</i>	59	98	100	59	98.3	100
16	<i>Kigelia pinnata</i>	49	82	100	60	100	100
17	<i>Moringa pterygosperma</i>	37	62	100	48	80	98.3
18	<i>Prosopis spicigera</i>	40	67	100	43	71.6	100
19	<i>Pongamia glabra</i>	21	35	100	26	43.3	100
20	<i>Tamarindus indica</i>	48	80	100	51	85	100

APPENDIX III

List of the seeds collected from Australia

Serial number	Name of species	Source	Number of seed pkts.
1	2	3	4
1	<i>Acacia acuminata</i>	Brokenhill, Wail nursery	3
2	<i>Acacia aneura</i>	Plant Introduction Division	1
3	<i>Acacia brachybotrea</i>	Port Augusta	1
4	<i>Acacia calamifolia</i>	Brokenhill	1
5	<i>Acacia baileyana</i>	Do	1
6	<i>Acacia panicifolia</i>	Do	1
7	<i>Acacia Sophorae</i>	Whyalla	1
8	<i>Acacia victoriae</i>	Port Augusta, Brokenhill and Wail nursery	3
9	<i>Acacia stenophylla</i>	Broken hill	1
10	<i>Acacia pycnantha</i>	Broken hill and Wail nursery	2
11	<i>Acacia podalyriaefolia</i>	Ditto	2
12	<i>Acacia gladiiformis</i>	Broken hill	1
13	<i>Acacia peuce</i>	Broken hill and Forestry and Timber Bureau Canberra.	2
14	<i>Acacia saucina</i>	Wail nursery	1
15	<i>Acacia farinosa</i>	Wail nursery	1
16	<i>Acacia ramulosa</i>	Plant Introduction Division	1
17	<i>Atriplex inflata</i>	Flowers Gap & Condoblen	2
18	<i>Atriplex vesicarium</i>	Ditto	2
19	<i>Atriplex nummularia</i>	Condoblen	1
20	<i>Atriplex pseudocampanulatum</i>	Do	1
21	<i>Atriplex spongosum</i>	Do	1
22	<i>Atriplex semibacatum</i>	Do	1
23	<i>Atriplex leptocarpa</i>	Do	1
24	<i>Atriplex campanulatum</i>	Do	1
25	<i>Atriplex pectinata</i>	Division of Plant Introduction Canberra.	1
26	<i>Bassia uniflora</i>	Ditto	1
27	<i>Bassia brachyptera</i>	Ditto	1
28	<i>Bassia obliquescuspis</i>	Ditto	1
29	<i>Bassia paradoxa</i>	Ditto	1
30	<i>Bassia biflora</i>	Ditto	1
31	<i>Bassia ericantha</i>	Ditto	1
32	<i>Callistemon speciosus</i>	S-Wyalla	1
33	<i>Cassia sturtii</i>	S. Wyhalla, Broken hill	2
34	<i>Cassia artemesioides</i>	Port Augusta, Broken hill	2
35	<i>Callistemon citrinus</i>	S. Whyalla	1
36	<i>Cassia eremophila</i>	Broken hill	1
37	<i>Callitris verrucosa</i>	Ditto	1
38	<i>Casuarina decaisneana</i>	Simpson desert, Australia and Port Augusta,	2
39	<i>Calytris microphlla</i>	Alice Spring	1
40	<i>Clianthus formosa</i>	Port Augusta	1
41	<i>Casuarina cristata</i>	Ditto	1
42	<i>Cassia phyllodinea</i>	Flowers gap	1
43	<i>Chloris ciliaris</i>	Ditto	1
44	<i>Cenchrus ciliaris</i>	Wagga Wagga	1
45	<i>Casuarina glauca</i>	Wail nursery	1
46	<i>Casuarina suberosa</i>	Ditto	1
47	<i>Chloris truncata</i>	Flowers gap-Condoblen	2
48	<i>Dodobaea cuneata</i>	Port Augusta	1
49	<i>Dodobaea lobulata</i>	Ditto	1
50	<i>Dodobaea microzyga</i>	Ditto	1
51	<i>Disphyma australe</i>	Wail nursery	1
52	<i>Eucalyptus leptophylla</i>	Whyalla	1
53	<i>Eucalyptus astringens</i>	Port Augusta and Broken hill	2
54	<i>Eucalyptus lansdowneana</i>	Port Augusta	1
55	<i>Eucalyptus viridis</i>	Ditto	1

APPENDIX III *Conted.*

Serial num- ber	Name of species	Source	Number of seed pkts.
1	2	3	4
56	<i>Eucalyptus grossa</i>	Broken hill	1
57	<i>Eucalyptus calophylla</i>	Do	1
58	<i>Eucalyptus gillii</i>	Do	1
59	<i>Eucalyptus flocktoniae</i>	Do	1
60	<i>Eucalyptus dundasi</i>	Do	1
61	<i>Eucalyptus calycogona</i>	Do	1
62	<i>Eucalyptus torquata</i>	Do	1
63	<i>Eucalyptus Stricklandi</i>	Broken hill & Wail nursery	2
64	<i>Eucalyptus odorata</i>	Broken hill	1
65	<i>Eucalyptus gracilis</i>	Do	1
66	<i>Eucalyptus erythronema</i>	Broken hill and Wail nursery	2
67	<i>Eucalyptus kruseana</i>	Broken hill	1
68	<i>Eucalyptus brockwayi</i>	Do	1
69	<i>Eucalyptus forrestiana</i>	Do	1
70	<i>Eremophila</i>	Do & Wail nursery	2
71	<i>Eremophila griffithsii</i>	Broken hill	1
72	<i>Eremophila ficifolia</i>	Do	1
73	<i>Eremophila woodwardii</i>	Do & Wail nursery	2
74	<i>Eremophila bicolor</i>	Broken hill	1
75	<i>Eremophila cladocalyx</i>	Wail nursery	1
76	<i>Eremophila caesia</i>	Do	1
77	<i>Eremophila marcocarpa</i>	Wail nursery	1
78	<i>Eremophila leucoxylon</i>	Do	1
79	<i>Eremophila largiflorens</i>	Do	1
80	<i>Erogrostis curvula</i>	Condoblen	1
81	<i>Erogrostis tefeff</i>	Do	1
82	<i>Enneapogon avenaceus</i>	Flowers gap	1
83	<i>Erythrina vespertilio</i>	Lucy Creek	1
84	<i>Enneapogon polyphyllus</i>	Alice spring	1
85	<i>Geijera parviflora</i>	Condoblen and Wail nursery	2
86	<i>Grevillia pterosperma</i>	Port Augusta	1
87	<i>Ginisea monosperma</i>	Do	1
88	<i>Hetrodendron oleifolium</i>	Condoblen	1
89	<i>Hetrodendron fregalum</i>	Whyalla	1
90	<i>Hakea lavirina</i>	Wail nursery	1
91	<i>Hardenbergia comptoniana</i>	Do	1
92	<i>Kennedya robiconda</i>	Do	1
93	<i>Iscilema membranaceum</i>	Flowers gap	1
94	<i>Kochia pyramidata</i>	Condoblen	1
95	<i>Kochia georgei</i>	Do	1
96	<i>Leptospermum langerum</i> <i>grandi-</i> <i>florum</i>	Wail Nursery	1
97	<i>Leptospermum coriaceum</i>	Do	1
98	<i>Malacocera tricornis</i>	Condoblen	1
99	<i>Melaleuca pubescens</i>	Whyalla, Broken hill, Wail and Telam bend.	4
100	<i>Melaleuca halxmaturorum</i>	Broken hill and Wail nursery	2
101	<i>Medicago denticulata</i>	Orroro	1
102	<i>Medicago minima</i>	Do	1
103	<i>Medicago tribuloides</i>	Wambi	1
104	<i>Medicago sculellata</i>	Do	1
105	<i>Melaleuca armillaris</i>	Wail nursery	1
106	<i>Melaleuca acuminata</i>	Do	1
107	<i>Mallee ecucalypt</i>	Wambi	1
108	<i>Myoporum platycarpum</i>	Wail nusery	1
109	<i>Trifolium glovevatum</i>	Wabmi	1
110	<i>Pittospermum phyllraeoides</i>	Wail nusery and Post Augusta	2
111	<i>Trifolium subterranean</i>	Wambi	1

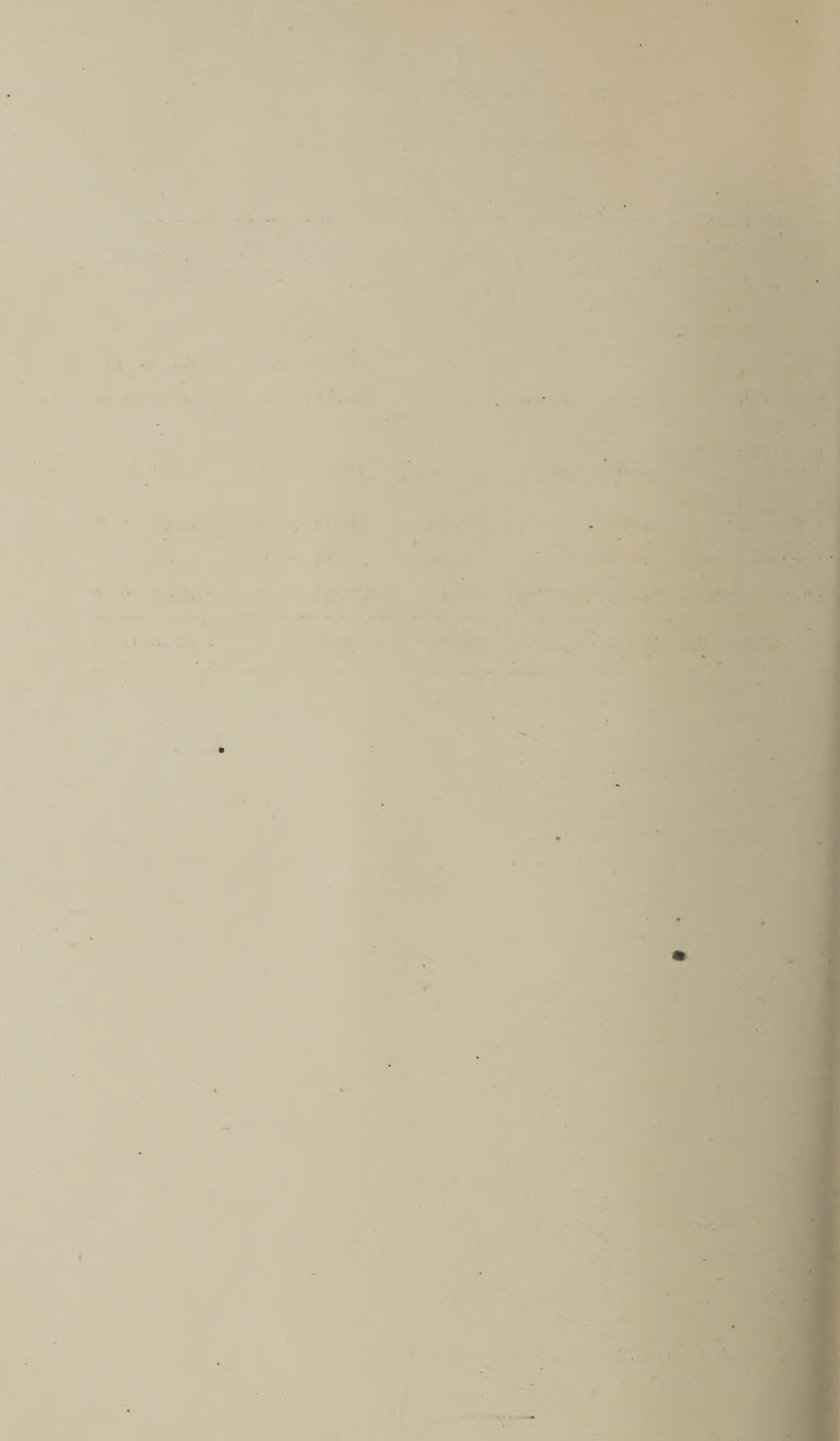
APPENDIX III—Contd.

Serial number	Name of specie	Source	Quantity
1	<i>Acacia cyanophylla</i>	Israel	250 gr.
2	<i>Ceratonia siliqua</i>	Do	300 gr.
3	<i>Celtis australis</i>	Do	300 gr.
4	<i>Crataegus azarolus</i>	Do	500 gr.
5	<i>Eucalyptus gomphococphala</i>	Do	500 gr.
6	<i>Eucalyptus occidentalis</i>	Do	50 gr.
7	<i>Pinus brutia</i>	Do	300 gr.
8	<i>Pistacia atlantica</i>	Do	100 gr.
9	<i>Zizyphus spinachristi</i>	Do	150 gr.
10	<i>Prosopis chilensis</i>	Do	20 gr.
11	<i>Prosopis siliquastrum</i>	Do	30 gr.
12	<i>Prosopis tamargo</i>	Do	10 gr.
13	<i>Rhus coriaria</i>	Do	100 gr.
14	<i>Cercis siliquastrum</i>	Do	200 gr.
15	<i>Caesalpinis crevifolia</i>	Do	20 gr.
16	<i>Cassia coquimbensis</i>	Chile (S. America.)	50 gr.
17	<i>Cordia decondra</i>	Do	50 gr.
18	<i>Porlieria chilensis</i>	Do	50 gr.
19	<i>Maytenus boaria</i>	Do	100 gr.
20	<i>Lithreaea caustica</i> (Litra)	Do	50 gr.
21	<i>Acacia cavenia</i>	Do	50 gr.
22	<i>Kagenechia oblonga</i>	Do	50 gr.
23	<i>Haloxylon persicum</i>	U. S. S. R.	1½ oz.
24	<i>Calligonum caput</i> (Medusae)	Do	2½ oz.
25	<i>Calligonum arborescens</i> (Libu)	Do	3 oz.
26	<i>Haloxylon aphyllum</i> (Minu)	Do	2½ oz.
27	<i>Calligonum setosum</i>	Do	3 oz.
28	<i>Calligonum turkestanicum</i>	Do	2½ oz.
29	<i>Ehodra Strobilaceae</i>	Do	2¾ oz.
30	<i>Salsola richeteria</i>	Do	5¾ oz.
31	<i>Parkinsonia aculeata</i>	Arizona, U.S.A	1 sample pkt.
32	<i>Cercidum floridum</i>	Do	1 sample pkt.
33	<i>Sesbania</i> spp.	Morocco	1 sample pkt.
34	<i>Indigofera tasmarica</i>	Do	1 sample pkt.
35	<i>Cupressus atlantica</i>	Do	1 sample pkt.
36	<i>Argania spinosa</i>	Do	1 sample pkt.
37	<i>Kaddi</i>	Do	1 sample pkt.
38	<i>Glyricidia</i> spp.	Do	1 sample pkt.

APPENDIX IV

Statement showing expenditure incurred every year

Budget Head Particulars	Expenditure					
	October, 1952 to March, 1953	1953-54	1954-55	1955-56	Up to December, 1956	
	Rs.	Rs.	Rs.	Rs. a. p.	Rs. a. p.	
Pay of Officers .	2,973	18,859	20,529	20,281 10 0	13,833 10 0	
Pay of Establish- ment .	1,666	17,551	34,058	41,711 5 0	33,431 0 0	
Allowances and Honoraria .	2,686	15,554	42,937	56,716 0 0	39,033 1 0	
Purchase of stores	26,728	24,001	27,394	13,864 0 0	..	
Other Charges .	34,725	1,67,658	2,56,479	2,52,834 0 0	1,49,295 0 0	
TOTAL Rs.	68,778	2,43,623	3,81,397	3,85,406 15 0	2,35,592 11 0	



with best of my compliments to
Dr. C.E. Kellogg.

Reprinted from the *Indian Agriculturist*, vol. II, no. 2, 1958.

J.C. Bhattacharya
13/8/59

LAND UTILIZATION SURVEY AND LAND USE PLANNING IN A TYPICAL LOCALITY SITUATED IN THE LATERITIC ZONE OF WEST BENGAL

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In connection with Bhoodan movement in the state large areas of less fertile lands mostly in the lateritic and red soil tract, had been gifted by donors to the landless labourers, with an idea in view that they would form cooperative organisation, to utilize those unproductive lands.

The cooperative organisation approached the research organisation of the State to have a land use plan for a sustained economic production.

With the above objective in view a land utilization survey was undertaken in representative villages, situated in a lateritic tract lying between the contours of 300 to 250 on either banks of the river Silabati.

Two villages Hairakatora (Gandhigram) and Krishnapore in Police station Simlapal of the district Bankura were selected. These are located between 22°55' N. latitude and 87°4'E. longitude.

The landscape of the two villages being of uniform pattern having similar influence of climate, topography, natural vegetation, moisture condition and geologic soil formation process, have been studied as an uniform unit.

The present paper deals with complete details of soil resources over 400 acres of land with an uniform land use planning.

OBSERVATIONS

Geomorphology :—

The landscape is of a rolling pattern with a massive capping of continuous laterite sheet overlying a greyish white soft, soapy and felspathic clay materials. The geologic formation of this part shows an ancient peneplanation with a subsequent radial uplift. The lateritic sheet is of varying thickness, where exposed by the force of gradation forms low-swellling ridges, having land surface in an undulated and at places extremely variable phases which have slopes of different degrees. The slopes are of moderate gradients ranging from 8 per cent. over high lands to 2 per cent. over low lying lands and run in Southern and North-Eastern directions towards the river Silabati.

The history of the place is one of the old forest site of a wild growth of *Shoera robusta* (*Sal*), *Bassia latifolia* (*Mahua*), *Butea frondosa* (*Palas*); sclerophyllous shrubs and ecologically suitable sod grass *Baboovi*. A few remnant of

these still persist but mostly wither in the dry months of the year. There are records how the unscrupulous clearing of the forest canopy by the early settlers, affected the gradual changes of the climate, resulting the occasional drought and uncertainty of rain in monsoon season. The climate is monsoonic having a mean annual rainfall of 51.86" inches. Almost 78 per cent. of the shower occurs within June to August. Records show that any deviation below the range of 78 per cent. shower in monsoon months causes a drought condition and total crop failure in the area.

The maximum temperature in the dry season fluctuates with rapid frequency from 93° F. in February to 112° F. in April with a subsequent lowering of surface humidity.

The Lang's factor for the locality is 48% and Meyer's N-S-Q is 348.5 which favour the Lateritic formation in this region.

The water table comes up to 3 feet below the surface over the highlands while it touches the surface and submerges at places in rainy season.

In winter and summer months it moves down to 30 feet below the surface.

The soil over the entire tract is of shallow to moderate effective depth. The surface texture over the highland is deep yellow brown coarse sandy loam and pale yellow sandy clay loam to clay loam in low land area.

A large number of soil profiles have been studied following the surface undulation. The typical profile of the area may be described as follows :—

1. A₁ horizon (0"-6")—having brownish yellow sandy loam, mostly with eroded phase.
2. A₂ horizon (6"-36")—having brownish yellow coarse sandy clay loam with brown beads of sesquioxides.
3. B₁ horizon (36"-40")—Massive but brittle layer of sesquioxide deposit, mixed up with more or less rounded to angular fragments of rocks and gravels.
4. B₂ horizon (40"-180")—Hard and massive layer of honeycombed structural sesquioxide deposit or Laterite layer.
5. C horizon (below 180")—stratified thick layer of greyish white to white clay. It is sticky when wet and gets easily peeled off along the cleavages at right angles to each stratum.

DISCUSSION

It is found from the details of observations that the clearance of forest to cultivated lands, have brought about a physical change like hardening of the soil. (Gupta, 1954).

Further the most negligent and defective way of cultivation, keeping the lands bare and fallow for a long period, with a high temperature in dry months,

have aggravated the causes of formation of non-capillary and total porosity in the soil, (Ramchandralu and Rao, 1954).

The bare and brownish yellow surface soil of the lands with light texture, absorbs lesser insolation, instead radiate much in the atmosphere near the surface, resulting the increased heat and decreased humidity in it, (Ramdas and Dravid, 1936). This causes the surface soil loose and dispersed with consequence of heavy soil loss during premonsoonic cloud burst in June.

The high temperature, bare and fallow land surface and defective cultivation result the lowering of soil productivity with subsequent large abandonment of cultivated lands.

According to the present land use of the area, it may be divided into the following land-capability categories following the U.S.D.A. classification :—

1. Highland—Category VI-A :—This is culturable waste land of about 40% the total area, with the slope of 8% to 6% inclining over the corresponding medium land. The surface soil is actually the A₂ horizon of the typical profile due to 80% sheet wash by rapid frequency of overflow in rainy season. The light but hardened soil with very low inherent fertility has a very shallow effective depth with rapid permeability.
2. Mediumland—Category IV-A :—This is 60% of the aerable part, of the area, growing *Aush* paddy in *Kahrif* season yielding 5 to 6 mds. per acre and leaving bare and fallow, rest of the year. This is a slopy land with 5% to 3% inclination over the low lands, with moderate degree of sheet erosion. The surface soil indicates a shallow A₁ horizon of the profile having brownish sandy loam with poor inherent fertility and rapid permeability.
3. Lowland—Category I :—This part of the locality is the centre of profit in the area and comprising 40% of the total aerable land in the locality. It is a land with two per cent. slope having a moderate inherent fertility used for *Amon* cultivation yielding 10 to 12 mds. per acre. The pale yellow clay loam, with deep effective depth and moderately slow permeability indicate the presence of optimum moisture condition for *Rabi* croppings. Soil erosion is about nil.

LAND-USE PLANNING

Having the idea of land capability, it is clear that the future land use planning should be done with the following considerations :—

1. To check the waste of monsoonic downpour with the subsequent soil loss.

2. To protect the superficial layer from high temperature and drought in dry months.
3. To raise the low productivity of soil to optimum level enabling the soil for high yield.

The planning of soil management and crop practice would be ideal if the land is taken to shift cropping that is an alternation of tillage crops with soil resting crop systems. The plots should be layed out as long, narrow strips, along contour with check bunds, as suggested by C. E. Kellogg, 1948, with possible uniform level.

I. Highland—Category VI-A: The land should be segmented into narrow strips of plots with grassy check bunds 1' high and narrow, level grassy channels along the contour to discharge the excess water. The plots should be left to ecologically suited sod grasses "*Babooi*" and quick growing plantation of Neem (*Melia azadirakta*) and *Mahua* (*Bassia Latifolia*) for at least 3 consecutive years, to regenerate the land suitable for cultivation, C. E. Kellogg, 1948.

The grass plantation would keep superficial soil layer protected from direct solar radiation resulting it to be cooler and with even temperature, Ramdas and Katti, 1934, 1936; Gilbert, 1945. Moreover, the grass cover would minimise the speed of runoff water, increasing the retentive moisture contact of the soil and reducing the soil loss as well, Borst and Woodburn, 1942. The plantation of *Neem* and *Mahua* would supply dead leaves as much and shed over the surface soil increasing surface humidity in dry season, (Ramdas and Katti, 1934, 1936; Spragne, 1955).

II. Medium land—Category IV-A:—It is the arable land of low fertility with 32% water holding capacity which is an unsatisfactory level of moisture retention in soil for good crop growth. The nutrient status of the soil, nitrogen as 15 lbs per acre, phosphate as 10 lbs per acre with low exchangeable bases and lime status indicated by pH 5.8 are not up to the level of optimum nutrient status for good crop growth.

The plots are managed as narrow strips with grassy check bunds and narrow channels running along the foot of bunds along the contour for the safe discharge of excess water over the corresponding lower plots. These plots should be taken to tillage crops with alternate soil resting crops. As the plots are deficient in optimum level of plant nutrients, the first step prior to any tillage crops, should be the application of F.Y.M. at the rate of 100 mds. per acre in combination with Superphosphate at the rate of 25 lbs per acre.

It has been established that F.Y.M. helps the soil with increased humus nitrogen by fixing atmospheric nitrogen and by increasing the available nitrogen status, Dhar, 1954. It also helps the soil to retain excess moisture content and increases the solubility of fixed phosphate, a typical problem of the lateritic soil with high sesquioxide contents, Midgley and Denkle, 1945.

The treatment of F.Y.M. with superphosphate in soil, prior to green manuring crops, the nitrogen level along with the available phosphate contents in the soil would be increased as established by Parr and Bose, 1944, 1947; Sen and Bains, 1955.

The plots with 5% slope and eroded phase lying adjacent to high lands should be taken to grass "*Babooi*" as soil resting crop for at least two years with one year alternative tillage crops. The corresponding plots with 4% to 3% slope having lighter soil of less eroded phase should be taken with tillage crops following a rotation system, as follows :—

Main Crop.

Rotation.

1. Paddy—Sunhemp (*Crotalaria juncea*)—*Aus-mixed* cropping (Linseed & Mustard)—fallow (Grass).
2. Wheat—Groundnut-wheat-mixed cropping—fallow (Grass). (Sesame & Gram) alternating wheat Plots.

III. Lowland :—Category 1—This is good aerable land with good water retentive capacity of 45%. The land is suitable for *Aman* paddy. The inherent nutrient status of the soil, having nitrogen 25 lbs per acre and phosphate 15 lbs per acre with pH 6.0 indicate moderate fertility, but unsatisfactory for high yield of paddy.

Application of recommended doses of F.Y.M. with Superphosphate should be added followed by green manure crop which would increase the level of nitrogen and phosphate available to the plant and also the organic matter in the soil, during the *Aman* cultivation.

The rotation should be as follows :—

Dhaincha (*Sesbania speciosa*)—*Aman*-fallow (Grass).

SUMMARY

A land utilization survey of 400 acres of land was undertaken in two villages situated in a lateritic region of West Bengal.

The lands were classified according to their fertility level, into the following categories.

1. Highlands—Category VI-A.
2. Mediumlands—Category IV-A.
3. Lowland—Category I.

A tentative land use planning for the area was made with the following points of considerations—

1. To check the waste of monsoonic downpour with subsequent soil loss.
2. To protect the superficial layer from high temperature and consequent drought condition in dry winter.
3. To raise the low level of fertility to optimum, enabling the soil to yield higher and better crops.

The land categories were divided into a number of long and narrow plots of uniform level along the contour with 1' high check bunds and grassy disposal channel running along contour successively. The Shift cultivation system with mulching process should be adopted.

The tillage cropping system should follow a definite rotation practice for 3 years.

ACKNOWLEDGEMENT

Thanks are due to Dr. S. K. Mukerjee, Agricultural Chemist, West Bengal, for his interest in the work. Thanks are also due to the organisers of the Bhoodan cooperative, for their kind help at the time of survey work.

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AGRICULTURAL ENGINEERING

FIRST YEAR

			<u>1st Term</u>	<u>2nd Term</u>	<u>3rd Term</u>
Hu	101	English Composition	1- 2- 1	1- 2- 1	1- 2- 1
Hu	102	Principles of Government (including constitution).	1- 0- 1	1- 0- 1	1- 0- 1
Ma	101	Mathematics	3- 2- 3	3- 2- 3	3- 2- 3
Ma	102	Mechanics	2- 1- 3	2- 1- 3	2- 1- 3
Ph	101	General Physics	2- 1- 2	3- 1- 2	3- 1- 2
Ph	104	Physics Laboratory	0- 2- 0	- - -	0- 2- 0
Ch	101	General Chemistry	3- 1- 2	2- 0- 2	3- 1- 2
Ch	103	Chemistry Laboratory	0- 2- 0	- - -	0- 2- 0
CE	101	Surveying I	1- 0- 1	1- 6- 1	0- 3- 0
CE	105	Engineering Drawing	1- 6- 0	1- 6- 0	1- 6- 0
ME	111	Workshop Practice	0- 5- 0	0- 5- 0	0- 4- 0
		Orientation and Engineering Materials.	1- 0- 1	1- 0- 1	1- 0- 1
			15-22-14	15-23-14	15-24-13

SECOND YEAR

All Terms

Hu	202	History and Economics	3- 0- 2
Ma	201	Advanced Calculus and Analytical Geometry	2- 1- 2
ME		Applied Mechanics (Fluid, Mechanics, Strength of Materials, Engineering Mechanics).	6- 3- 6
ME	211	Workshop Practice	0- 3- 0
ME	232	Thermodynamics	2- 1- 2
ME	252	Design of Machine Elements and Drawing	1- 3- 1
Met	202	Engineering Metallurgy II	1- 0- 1
CE	201	Surveying II	1- 3- 1
CE	203	Building Construction and Drawing	1- 3- 1
AgE	201	Principles of Crop Production I	2- 1- 2
			19-18-18
Option			2- 0- 2
			21-18-20
			=====

Note:- First Year in Agricultural Engineering Course and most of Second Year Agricultural Engineering Course is common with other engineering departments.

		<u>1st Term</u>	<u>2nd Term</u>	<u>3rd Term</u>	<u>1st Term</u>	<u>2nd Term</u>	<u>3rd Term</u>
	Humanities Elective	1- 0- 1	1- 0- 1	1- 0- 1	50- 0	50- 0	50- 0
ME 334	Heat Power Engineering	2- 2- 2	2- 2- 2	2- 2- 2	100- 50	100- 50	100- 50
ME 341	XXX Hydraulic Machines	2- 1- 2	2- 1- 2	2- 1- 2	100- 50	100- 50	100- 50
ME 352	Machine Elements design	2- 3- 1	2- 3- 1	2- 3- 1	100- 75	100- 75	100- 75
Ge 310	General Geology	2- 1- 2	2- 1- 2	- - -	100- 50	100- 50	- - -
AgE 201	Principles of Crop Production I	2- 1- 2	2- 1- 2	2- 1- 2	100- 50	100- 50	100- 50
AgE 302	Soil Science	2- 3- 2	2- 3- 2	2- 3- 2	100- 75	100- 75	100- 75
AgE 303	Soil and Water Conservation Engineering including Irrigation. I.	- - -	- - -	2- 1- 2	- - -	- - -	100- 50
AgE 304	Principles of Crop Production II	2- 3- 2	2- 3- 2	2- 3- 2	150-100*	150-100	150-100
AgE 305	Farm Machinery	3- 3- 3	3- 3- 3	3- 3- 3	150-100*	150-100	150-100
		18-17-17	18-17-17	18-17-17	950-550	950-550	950-550

Option

3- 0- 3	3- 0- 3	3- 0- 3
21-17-20	21-17-20	21-17-20

* 50 marks from each are allotted for practical training at the end of Second Year. Total marks for practical training - 100.

FOURTH YEAR (1957-58)

		<u>All Terms</u>	<u>All Terms</u>
	Humanities Elective	1- 0- 1	50- 0
Age 304	Principles of Crop Production II	2- 3- 2	150- 100
Age 401	Farm Management & Agricultural Extension	3- 2- 3	150- 100
Age 403	Soil and Water Conservation Engineering including Irrigation and Drainage II.	4- 3- 3	200- 100
Age 404	Rural Electrification and Processing	1-1-1- 1	100- 50
Age 405	VVA Farm Engines and Tractors	3- 3- 3	150- 100
Age 406	Project and Report	1- 4- 3	0- 250*
		-----	-----
		15-16-16	800- 700
	Option"	3- 0- 3	" 300 Thesis (4th Term)
		18-16-19	Viva- Voce 200

"Statistics, Soil Chemistry, Prime Movers, Surveying, Metallurgy or any other in consultation with Agricultural Engineering Department.

* 100 marks are allotted for practical training at the end of 3rd Year in the First Term. 50 marks are allotted for tour reports during the Second Term.

THIRD YEAR (1958 onwards)

		<u>1st Term</u>	<u>2nd Term</u>	<u>3rd Term</u>	<u>1st Term</u>	<u>2nd Term</u>	<u>3rd Term</u>
	Humanities Elective	1- 0- 1	1- 0- 1	1- 0- 1	50- 0	50- 0	50- 0
ME 334	Heat Power Engineering	2- 2- 2	2- 2- 2	2- 2- 2	100- 50	100- 50	100- 50
ME 341	Hydraulic Machines	2- 1- 2	2- 1- 2	2- 1- 2	100- 50	100- 50	100- 50
ME 352	Machine Elements Design	2- 3- 1	2- 3- 1	2- 3- 1	100- 75	100- 75	100- 75
Ge 310	General Geology	2- 1- 2	2- 1- 2	- - -	100- 50	100- 50	- - -
EE 301	General Electrical Engg.	2- 2- 2	2- 2- 2	2- 2- 2	100- 50	100- 50	100- 50
AgE 302	Soil Science	2- 3- 2	2- 3- 2	2- 3- 2	100- 75	100- 75	100- 75
AgE 303	Soil and Water/ Conservation Engineering including Irrigation & Drainage I.	- - -	- - -	2- 1- 2	- - -	- - -	100- 50
AgE 304	Principles of Crop Production II.	2- 3- 2	2- 3- 2	2- 3- 2	150-100*	150-100	150-100
AgE 305	Farm Machinery	3- 3- 3	3- 3- 3	3- 3- 3	150-100*	150-100	150-100
		18-18-17	18-18-17	18-18-17	950-550	950-550	950-550
	Option"	3- 0- 3	3- 0- 3	3- 0- 3	- - -	- - -	- - -
		21-18-20	21-18-20	21-18-20	- - -	- - -	- - -

* 50 marks from each are allotted for practical training at the end of Second Year. Total marks for practical training - 100.

FOURTH YEAR (1958 onwards)

		All Terms	All Terms
Humanities Elective		1- 0- 1	50- 0
Age 410 Farm Management and Agricultural Extension		3- 2- 3	150-100
Age 402 Theory and Design of Farm Structures		3- 3- 3	150-100
Age 403 Soil and Water Conservation Engineering including Irrigation and Drainage II		4- 3- 3	200-100
Age 404 Rural Electrification and Processing		1- 1- 1	100- 50
Age 405 Farm Engines and Tractors		3- 3- 3	150-100
Age 406 Project and Report		1- 4- 3	0-250*
		16-16-17	800-700
Option"		3- 0- 3	"300 Thesis (4th Term)
		19-16-20	Viva Voce 200

* 100 marks are allotted for practical training at the end of 3rd year in the First Term. 50 marks are allotted for tour reports during the Second Term.

SUBJECTS OF INSTRUCTION

201 Principles of Crop Production I (2-1-2)

Farm crops of India: Classification, distribution, acreage and yield. Structures and functions of different plant organs. Nutrition, water relations, growth, development and reproduction. Laws of heredity, methods and techniques of breeding improved varieties of crop plants. Causes and symptoms of common diseases and their control measures. Important characters of farm crops and soil conserving plants.

302 Soil Science (2-3-2)

Soil origin, formation, classification, physical properties, plant nutrients, soil colloids, soil organisms, organic matter, forms of soil water, water movement. Soil-water plant relationships. Vapour and liquid losses, soil air, temperature, acidity, alkalinity, liming. Nitrogen influence, phosphorus, potassium, trace elements, fertilizers, farm manures, green manure, and fertility management. General principles of soil mechanics; stability of slopes and retaining walls; consolidation and settlement.

303 Soil & Water Conservation Engineering including Irrigation and Drainage I (2-1-2) Third Term

Conservation defined, engineering phases, causes of soil damage, precipitation, runoff, measurement of runoff, stream gauging, hydrographs, Erosion control, vegetative methods, mechanical methods, controlled water courses, terracing, contour practice Gully control.

304 Principles of Crop Production II (2-3-2)

Soil management: Tillage, its objects and methods, tillage, operations and implements. Manures and fertilizers; doses, time, methods of application and unit value. Weeds and weeding: effects and control methods.

Crops and cropping schemes: Soil and climatic requirements. Seed bed preparation, sowing time and rate, manuring, interculturing, irrigating, harvesting, threshing and processing of important field crops of India. Calendar of farm operations; labour and power requirements of crops. Crop rotations; cropping schemes; mixed cropping; dry farming. Improvement of soil by judicious cropping and management of saline, alkaline and acidic soils. Pastures and agronomic practices for soil conservation.

Animal husbandry and dairying: its relationship to Indian Agriculture. Important breeds of draft and milch cattle; their feeding and management. A brief account on processing of milk and milk products.

305 Farm Machinery (3-3-3)

Farm machinery and its relation to agriculture. Primary and secondary seed bed preparation machinery. Seeding, planting and interculturing machines. Fertilizing equipment. Sprayers and dusters. Hay and forage harvesting equipment. Grain and other harvesting machinery. Threshing machinery. Crop processing machines. Dairy equipment. Transportation equipment. Small earth moving machines.

401 Farm Management and Agricultural Extension (3-2-3)

Scope and subject, Principles underlying selection of farm, farm layout and types of farming. Farming as business; size of farm business and farm organization. Farm labour distribution and management. Marketing farm produce: grading, standardization transport, and governmental legislation. Determination and fluctuations of prices of agricultural commodities. Farm costing and cost

OPTIONAL SUBJECTS

The Department of Agricultural Engineering offers the following Optional Subjects:-

AgE 031 HORTICULTURE

A course on flower and vegetable gardening, including ornamental plants suitable for avenues and gardens in India. Techniques for their successful culture: methods of raising seedlings and vegetative propagation of plants like cutting, grafting etc.; making beds, pits and layout of gardens; manuring and watering. Structure and functions of plant organs. Methods of breeding. Plant disease control. Storage of seeds and bulbs.

AgE 032 SOIL CONSERVATION

Soil formation and classification, physical properties, soil fertility, causes of soil damage and depletion, erosion by water runoff and wind. Benefits of soil conservation, land use concept, vegetative and mechanical controls, terracing, contour practices, control of small water courses, and role of vegetation in conservation, pastures and forest. Water Conservation, ponds, tanks, small earth dams, ground water recharging, drainage, irrigation, up stream flood control, conservation planning, and soil conservation organizations.

AgE 033 FARM MACHINERY

The role of machinery and equipment in agriculture. Agricultural output by hand vs. mechanical methods, Tillage machinery - ploughs, harrows, disks, and rollers; seeding machinery, cultivators, harvesters and threshers. Special machinery for preparing fodder, grinding, fertilizer distribution, earth moving, and dairy farming. Selection, care, and maintenance of machinery. Calculation of machinery capacity and costs.

AgE 034 CROPS AND IRRIGATION

Importance of irrigation for crops in relation to soil and climate. Principles and practices of irrigation useful to irrigation engineers. Water requirements of field crops and orchards.

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ESTIMATED FERTILIZER REQUIREMENTS,
PRODUCTION AND IMPORTS 1955-1975.

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MINISTRY OF FOOD AND AGRICULTURE
Department of Agriculture
New Delhi

July 18, 1957

ESTIMATED FERTILIZER REQUIREMENTS,
PRODUCTION AND IMPORTS 1955 - 1975

The purpose of this memorandum is to present estimates of India's fertilizer requirement, import and production program for meeting those requirements and to assess the cost and benefits of the suggested program.^{1/}

1. Summary

This note suggests that fertilizer consumption be increased from an estimated 225,000 tons of plant nutrients in 1957 to 470,000 tons in 1960, 1,000,000 in 1965 and 2,100,000 tons in 1975. An import program costing \$136 millions in 1958-62 and new plants costing about \$600 million would be required to provide the fertilizer.

The suggested fertilizer program would increase agricultural production by the equivalent of 3.52 million tons of grain in 1960, 11.1 million tons in 1965 and 22.8 million tons in 1975. It is estimated each dollar spent for fertilizer imports will produce increased crops valued at \$5.1. The total value of the crop increase from fertilizer would be \$505 million in 1960 and steadily increase to \$2172 million in 1965.

The success of India's entire development program depends on a rapid and steady increase in agricultural production. Five major factors in securing such an increase are fertilizers, water, improved seed, credit and an effective extension service. The Plan

^{1/} Several notes, reports and publications of the Ministry of Food and Agriculture and of other Ministries concerned with fertilizer production have been extensively utilized in the preparation of this note.

makes provision for all of these. Of these only fertilizer requires substantial foreign exchange. If there is a failure to go forward with the fertilizer program of the type indicated the returns from water, improved seed, credit and the extension service will be reduced. Every effort therefore should be made to fully implement the fertilizer program of the Second Five Year Plan and to extend it in subsequent years along the lines indicated in this note.

2. Total requirements:

The estimated fertilizer requirements for consumption in table 1 and figure 1 have been prepared on the basis of the following assumptions:

(a) It is essential to rapidly increase agricultural production and the use of fertilizers is one of the most effective methods of obtaining such an increase.

(b) A high level of fertilizer imports will be maintained in 1958-61.

(c) Phosphate consumption should be increased to provide a N : P₂O₅ ratio of 2 : 1 in 1975.

Experiments of the past three years indicate that phosphate/potash requirements have been underestimated. It may well be that the requirements indicated in table 1 will need be revised upward within a few years.

The plant nutrient consumption ratio for the world were 1 : 1.12 : 0.95 in 1956. India will undoubtedly alter the ratio from 10 : 1 : 1 in 1955 toward the world ratio.

Table 1
Fertilizer requirements 1955-1975
(1000 metric tons)

Year	Nitrogen N	Phosphate P ₂ O ₅	Potash K ₂ O	Total Nutrients
1955	115	12	10	137
1956	150	15	12	177
1957	190	20	15	225
1958	240	30	20	290
1959	290	50	30	370
1960	350	80	40	470
1961	420	100	50	570
1962	490	125	60	675
1963	560	150	70	780
1964	630	175	85	890
1965	700	200	100	1000
1970	1000	400	200	1600
1975	1200	600	300	2100

3. Requirements - materials and mixtures:

The distribution of the three plant nutrients between materials for direct application and mixed fertilizers given in table 2 is based on the following assumptions:

(a) Cultivators should be furnished mixed fertilizers when two or more plant nutrients are needed at the same time.

(b) 75% of the phosphate will be used in mixed fertilizers.

(c) All potash will be used in mixed fertilizers.

(d) The average ratio of N to P_2O_5 in mixed fertilizers will be 1 : 1.

Table 2

Estimated distribution of plant nutrients between materials for direct application and mixed fertilizers 1955 - 1975.

(1000 metric tons)

Year	Nitrogen N		Phosphate P_2O_5		Potash K_2O ^{1/}
	Materials	Mixtures	Materials	Mixtures	Mixtures
1955	100	15			10
1960	290	60	20	60	40
1965	550	150	50	150	100
1970	650	350	100	300	200
1975	750	450	150	450	300

^{1/} All potash in mixtures.

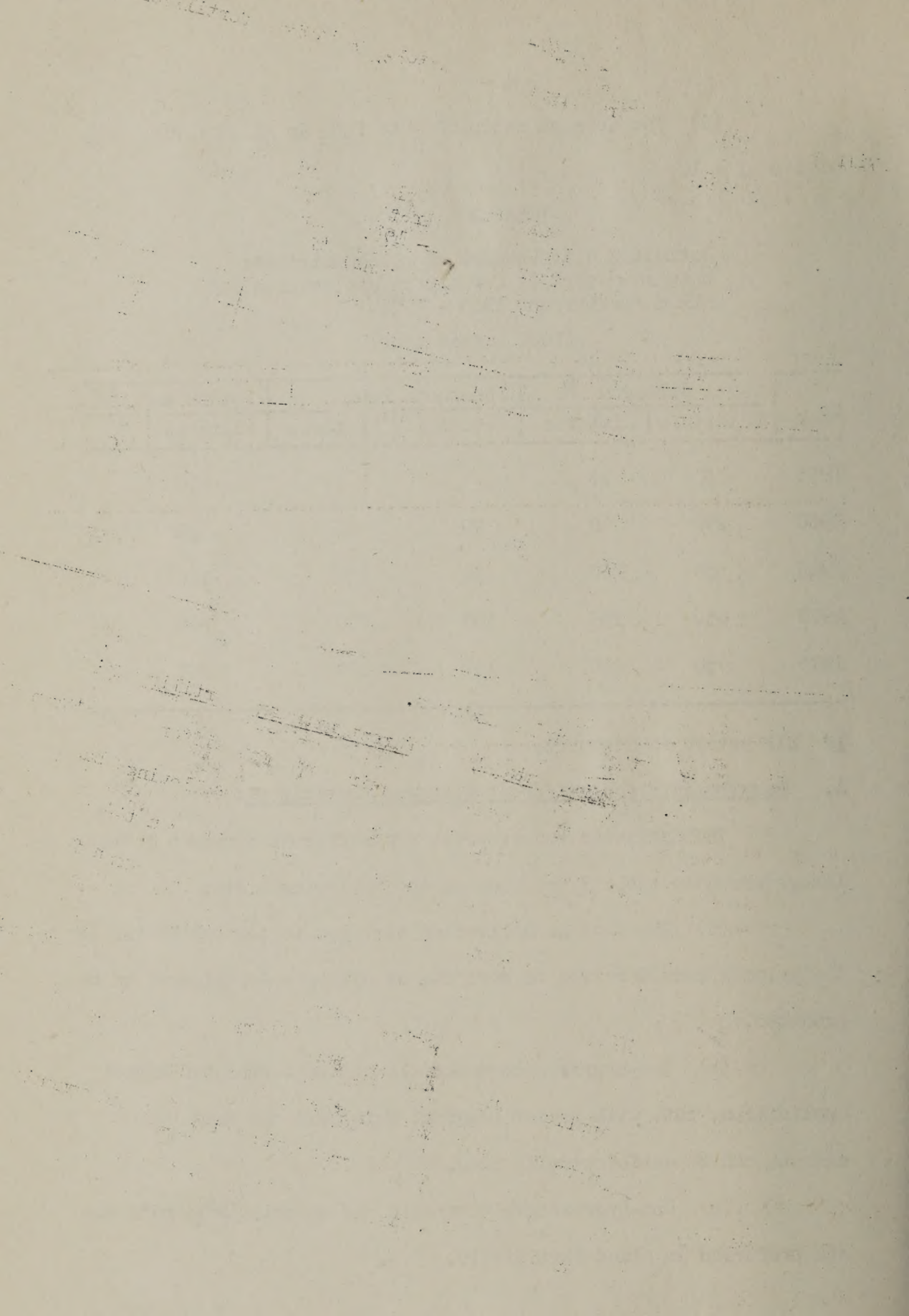
4. Requirements for different nitrogen fertilizers:

The estimated requirements for different nitrogen fertilizers shown in table 3 are made on the following basis:

(a) The cost of delivering nitrogen to the cultivator is the primary consideration in deciding on nitrogen fertilizers to be produced.

(b) Non-hygroscopic materials are preferred for direct application, but, with proper bagging, both urea and ammonium nitrate can be satisfactorily used.

(c) Non-hygroscopic materials and ammonia (NH_4) nitrogen are preferred in mixed fertilizers.



(d) Anhydrous ammonia and ammonia solutions which contain urea or ammonium nitrate will be used to the maximum that is technically feasible because of their low cost.

Table 3
Estimated requirements of different
nitrogen fertilizers 1955 - 1975.
(1000 metric tonsN)

Year	Direct application				Mixture		Total
	Ammonium Sulphate	Urea 1/	Ammonium Sulphate Nitrate. 1/	Ammonium Nitrate 1/	Ammonium Sulphate	Ammonia Solution. 2/	Ammonium Sulphate
1955	100	3	-	-	12	-	115
1960	100	140	40	10	50	10	150
1965	110	300	40	100	75	75	185
1970	60	400	40	150	175	175	235
1975	60	450	40	200	200	250	260

1/ All urea, ammonium sulphate-nitrate and ammonium nitrate are for direct application. The ammonia solution will contain all of the hygroscopic materials, urea and ammonium nitrate that can be used in mixed fertilizers.

2/ Includes process nitrogen in complex fertilizers such as nitro-phosphates.

The division of nitrogen tonnage between ammonium sulphate, ammonium nitrate and ammonia solutions will be largely determined by the choice of processes for producing high analysis granular mixed fertilizers. Nitric acid processes and the production of nitro-phosphate would result in relatively high production of ammonium nitrate. Sulphuric acid processes and the production of ammoniated triple superphosphate would lead to a higher proportion of ammonium sulphate.

5. Requirements for different Phosphates:

Estimated phosphate requirements by materials in the following table have been prepared on the assumption that future increase in production would be as high analysis phosphate including triple superphosphate, nitro-phosphate and ammonium phosphates.

Table 4

Estimated requirements of different
Phosphate fertilizers 1955 - 1975
(1000 metric tons P_2O_5)

Year	Normal Super- phosphate.	Triple <u>1/</u> Super- phosphate	Nitro- phosphate	Total
1955	12	-	-	12
1960	50	30	-	80
1965	50	100	50	200
1970	50	250	100	400
1975	50	350	200	600

1/ Includes ammonium phosphates.

6. Nitrogen production and imports:

A nitrogen fertilizer production and import schedule designed to meet the stated requirements is given in table 5 and figure 2.

Table 5
Nitrogen Imports and Production 1955-75
(1000 metric tons N)

Year	Imports	New Production	Total production	Consumption
1955	37	0	78	115
1956	72	0	78	150
1957	105	7	85	190
1958	125	30 ^{1/}	115	240
1959	160	15 ^{1/}	130	290
1960	200	20 ^{2/}	150	350
1961	165	105 ^{3/}	255	420
1962	40	190 ^{4/}	450	490
1963	0	110 ^{5/}	560	560
1964	0	80 ^{5/}	630	630
1965	0	70 ^{5/}	700	700
1970	0	300 ^{5/}	1000	1000
1975	0	200 ^{5/}	1200	1200

^{1/} Sindri expansion.

^{2/} Nangal.

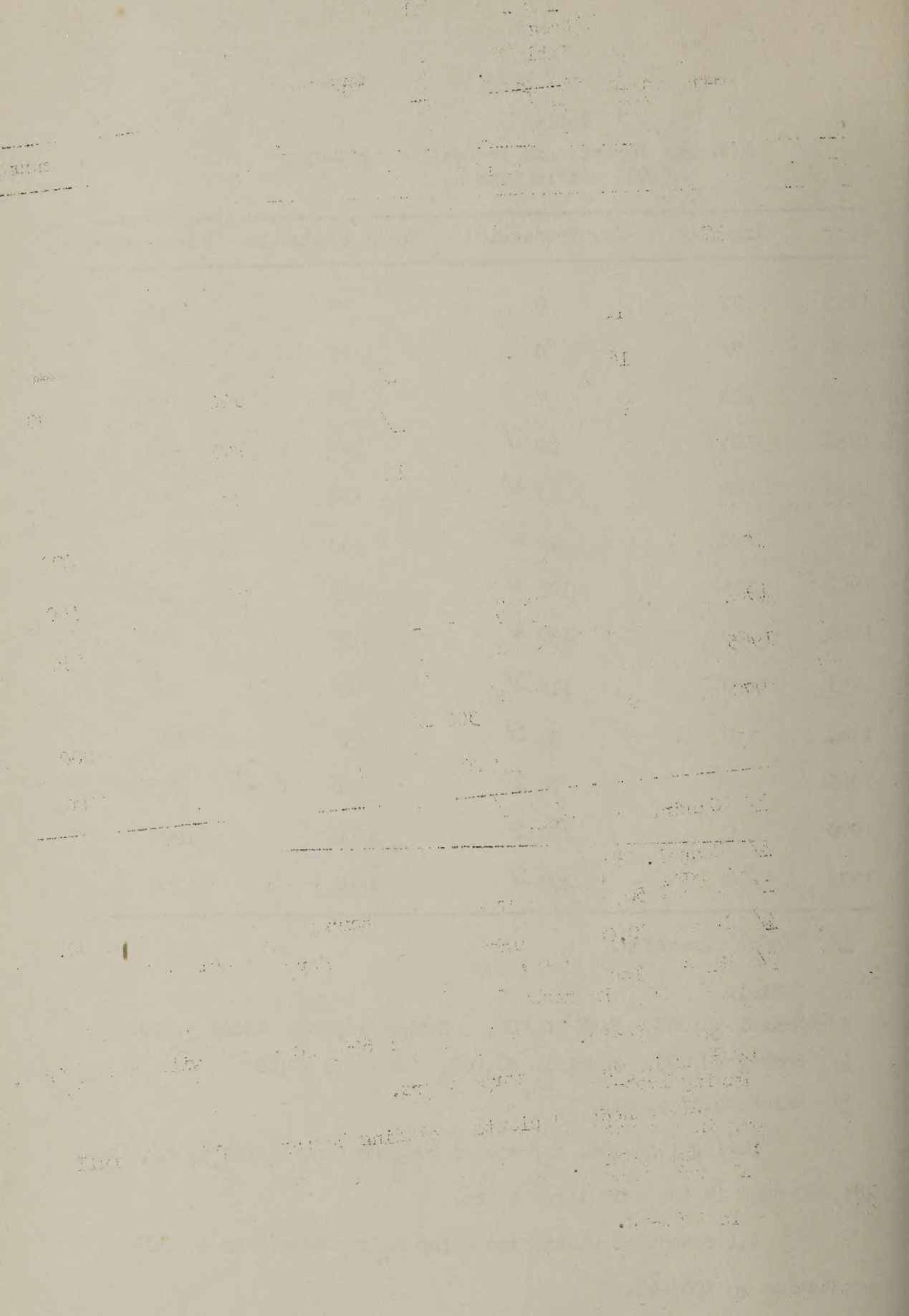
^{3/} Nangal 50,000, FACT 10,000, Bombay 40,000, Steel 5,000.

^{4/} Bombay 40,000, Rourkela 80,000, Neyveli 70,000

^{5/} Unscheduled plants.

During 1958-1962 imports of 690,000 tons N will be required, 485,000 tons in the next three years.

All scheduled plants including Bombay should be in full production in 1961-62.



New plants of capacity of 260,000 tons N should be brought into production in 1963-65, 300,000 tons in 1965-70 and 200,000 tons in 1970-75.

An estimate of nitrogen production by locations and materials is given in table 6.

Table 6
Nitrogen fertilizer production schedule
by locations and materials.
(1000 metric tons N)

Location	First Year	Ammonium Sulphate	Ammonium Sulphate Nitrate	Urea	Ammonium Nitrate	Ammonia Solutions
Sindri	1952	70				
Sindri Ex.	1958		40	10		
FACT		10				
FACT Ex.	1960	10				
Nangal	1960				70	
Rourkela	1960			40	40	
Neyveli 1/	1960 1/			70 1/		
Bombay	1961	20		40		20
Unscheduled	1962	20		40		20
"	1963-65	55		100		35
"	1966-70	50		100	50	100
"	1971-75	25		50	50	75

1/ The production of high analysis mixed fertilizer of the 20:20:0 or 15-15-15 type may be considered. It might reduce urea production to 40,000 tons N.

New plant capacity of 200,000 units should be
 brought into production in 1955-56, 300,000 units in 1956-57 and
 400,000 units in 1957-58.
 The estimate of 2 million units for 1955-56 and
 3 million units for 1956-57 is given in table 1.

Table 1
 Production of electrical appliances
 in India, 1955-56 to 1957-58

Year	Production (in units)	Percentage of total production
1955-56	2,000,000	33.33
1956-57	3,000,000	50.00
1957-58	4,000,000	66.67
Total	9,000,000	100.00

The above figures are based on the assumption that the production of electrical appliances will increase at a steady rate of 100% per annum.

7. Phosphate production:

A phosphate production schedule should be planned to meet the estimated requirements shown in tables 1 and 4.

A high proportion of the new production should be linked with nitrogen production to produce high analysis granular mixed fertilizers. The first such plants might be at Neyveli and Bombay:

8. Phosphate and Potash imports:

Only minor quantities of phosphate rock and potash salts are produced in India. For the purpose of this note it is assumed all phosphate and potash materials will be imported. The estimates are given in table 7.

It is also assumed that elemental sulphur or equivalent pyrites will be imported for the production of sulphuric acid. This estimate is included in table 7.

Table 7
Estimated imports of Phosphate rock, Potash
salt and Sulphur.
(1000 metric tons)

Year	Phosphate Rock	Potash ^{1/} Salts.	Sulphur
1955	36	17	1.5
1960	240	66	10
1965	600	166	25
1970	1200	333	50
1975	1800	500	75

^{1/} Muriate of Potash, 60% K₂O.

The import of phosphate rock and sulphur might be reduced by importing high analysis phosphatic fertilizers such as triple superphosphate and ammonium phosphates. The relative merits of the two alternatives should be carefully evaluated both on a short term and long term basis.

9. Sites for plants:

The selection of fertilizer plant locations will depend on the availability of essential raw materials and markets.

The more important raw materials for nitrogen fertilizers are the energy materials coal, natural gas and oil including oil refinery gas and water. Electric power is not included, for, it is probably not economically sound to use this form of energy to produce hydrogen for ammonia synthesis when India's other demands for electric power are increasing so fast. Major consideration should be given to coal, including coke oven gases and oil. The former would be at interior locations, the latter at ports or producing fields including Assam.

The several interior locations based on coal and listed by Dr. Nagaraja Rao seems satisfactory. At those locations nitrogen fertilizers should be produced primarily for direct application.

Full advantage should be taken of the oil refinery gases at Bombay and Visakhapatnam. Existing supplies may be supplemented by imported oil. Oil may also be used at other coastal points such as Mangalore, Madras, Calcutta, Cochin or other ports with adequate supply of process water.

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Future plants at port locations should produce mixed or complex fertilizers as well as nitrogen for direct application.

10. Processes:

The only comments on processes relate to those for producing mixed or complex fertilizers.

Nitrate phosphates are produced by treating phosphate rock with nitric acid which is made from ammonia. Several processes have been developed in Europe and by TVA in the United States. These processes are attractive for India as they avoid the need for importing sulphur. The nitro-phosphates, however, are generally rather hygroscopic and contain about one-half of the nitrogen in the nitrate(NO_3) form. The latter is not very satisfactory for paddy when applied under conditions that permit high efficiency of the phosphate and ammonium nitrogen. The utility of nitro-phosphates in India may be considerable but they will not meet all needs for mixed fertilizers.

A second process for producing non-hygroscopic high analysis granular fertilizers containing ammonium nitrogen involves (1) producing triple superphosphate by the standard process, (2) producing ammonium sulphate by the Sindri process using the calcium sulphate produced when making triple superphosphate, and (3) ammoniating and granulating a mixture of triple superphosphate and ammonium sulphate with a urea-ammonium solution to produce fertilizers analyzing about 16-20-0. The process uses the sulphur twice, as sulphuric acid and to make ammonium sulphate. It uses the hydrogen of the sulphuric acid three times, twice to decompose phosphate rock and finally to fix ammonia.

The products and the production schedule indicated in this note provide for both of these processes. Each should be tried at an early date.

The production of electric furnace phosphorous, phosphoric acid and diammonium phosphate on a pilot scale at Sindri has been recommended by Dr. S. K. Mukherjee. Before this is undertaken a determination should be made regarding the availability of large amounts of electric power for such furnaces in view of other demands for power. It seems probable that in India, as in almost all the world, electric power should be used for purposes other than for the production of phosphoric acid or hydrogen.

11. Cost and Benefits:

The economic assessment of a project involves a determination of the cost and benefits. Such a determination follows.

The cost of imported fertilizer materials is given in table 9.

Table 9

Cost of imported Plant Nutrients
and related Raw Materials.

Plant Nutrient or Material	Cost per ton	
	Rupees	Dollars
Nitrogen N	1250	260
Potash K ₂ O	625	130
Phosphate Rock	110	23
Sulphur S	220	46

The following is a list of the names of the persons who have been appointed to the various committees of the Board of Directors of the United States National Bank, for the year ending December 31, 1900.

1. Committee on the part of the Board of Directors to investigate the condition of the bank, and to report thereon to the Board at its next meeting.

2. Committee on the part of the Board of Directors to investigate the condition of the bank, and to report thereon to the Board at its next meeting.

3. Committee on the part of the Board of Directors to investigate the condition of the bank, and to report thereon to the Board at its next meeting.

4. Committee on the part of the Board of Directors to investigate the condition of the bank, and to report thereon to the Board at its next meeting.

5. Committee on the part of the Board of Directors to investigate the condition of the bank, and to report thereon to the Board at its next meeting.

6. Committee on the part of the Board of Directors to investigate the condition of the bank, and to report thereon to the Board at its next meeting.

7. Committee on the part of the Board of Directors to investigate the condition of the bank, and to report thereon to the Board at its next meeting.

8. Committee on the part of the Board of Directors to investigate the condition of the bank, and to report thereon to the Board at its next meeting.

9. Committee on the part of the Board of Directors to investigate the condition of the bank, and to report thereon to the Board at its next meeting.

10. Committee on the part of the Board of Directors to investigate the condition of the bank, and to report thereon to the Board at its next meeting.

11. Committee on the part of the Board of Directors to investigate the condition of the bank, and to report thereon to the Board at its next meeting.

12. Committee on the part of the Board of Directors to investigate the condition of the bank, and to report thereon to the Board at its next meeting.

13. Committee on the part of the Board of Directors to investigate the condition of the bank, and to report thereon to the Board at its next meeting.

Chief Clerk of the Board of Directors

Secretary of the Board of Directors

Committee on the part of the Board of Directors to investigate the condition of the bank, and to report thereon to the Board at its next meeting.

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The capital investment in fertilizer plants has been estimated on the assumption that the average capital cost per annual ton is:

Nitrogen, N \$450

Phosphate P₂O₅ \$125

The estimated crop increase from the use of fertilizers is based on data obtained in the last three years from thousands of experiments and tens of thousands of demonstrations on cultivators' fields. The returns that may be expected are given in table 10.

Table 10
Crop increase per ton of plant nutrients

Nutrient	Unit	Grain <u>1/</u>	Straw <u>2/</u>	Total
N	Tons	12	24	-
	Rupees	4,800	662	5,462
	Dollars	1,008	143	1,151
P ₂ O ₅	Tons	10	20	-
	Rupees	4,000	540	4,540
	Dollars	840	113	953
K ₂ O	Tons	8	16	-
	Rupees	3,200	432	3,632
	Dollars	672	90	762

1/ Rs.15 per md., Rs.400 per ton or \$84 per ton.

2/ Rs.1.0 " " Rs.27 " " " \$5.65 " "

The crop return per unit of nitrogen shown in table 10 is substantially lower than is obtained in Europe and the United States. Most European countries report a return of 14 to 20 units of grain

The following table shows the results of the experiment.

The results are given in the following table.

The results are given in the following table.

TABLE I

Results of the experiment.

The results are given in the following table.

The results are given in the following table.

The results are given in the following table.

The results are given in the following table.

The results are given in the following table.

TABLE II

The results are given in the following table.

The results are given in the following table.

The results are given in the following table.

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The results are given in the following table.

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per unit of nitrogen. The average for eleven countries is 16, or 33 percent higher than the assumed return in India. This indicates the possibility of substantially increasing the efficiency of fertilizer practices.

An import program:

The magnitude of the import program is indicated in tables 5 and 7 and in figure 2. The cost and returns from such a program are summarized in table 11.

Table 11
Cost and benefits of fertilizer
import program, 1958-1962.

Year	Unit ^{1/}	Nitrogen	Phosphate & Sulphur	Potash	Total
1958	Cost \$	33.0	0.77	0.56	33.43
	Grain, tons	1.50	0.30	0.16	1.96
1959	Cost \$	41.6	1.61	0.84	44.05
	Grain, tons	1.92	0.50	0.24	2.66
1960	Cost \$	52.0	2.99	1.12	56.11
	Grain, tons	2.40	0.80	0.32	3.52
1961	Cost \$	43.4	4.60	1.40	49.40
	Grain, tons	1.98	1.00	0.40	3.38
1962	Cost \$	10.4	6.21	1.68	18.29
	Grain, tons	0.48	1.25	0.48	2.21

^{1/} All figures in millions (1,000,000).

The suggested imports would cost \$236.14 million (\$150.75 millions in the remaining three years of the Second Plan and \$85.39 millions in the first two years of the Third Plan.) Are such expenditures warranted?

The three-year import program would produce 8.4 million tons of grain and 16.28 million tons of straw much of which would be used as cattle fodder. The increased crop yield would have a value of \$766 million. This is a return of \$5.1 for \$1.0 spent for imported fertilizers. If it is assumed the grain is absolutely essential the fertilizer import program would reduce grain imports by \$250 millions an year with a net saving in foreign exchange of \$200 millions per year.

The import program is also needed to steadily increase the demand for the fertilizers that are to be produced in the new plants. Thus the import program would ensure rapid offtake of new production.

Plant investment and return:

The total capital investment required to increase the domestic capacity to 1200,000 tons N and 600,000 tons P_2O_5 in 1975 would be about \$600 million.

The increase in agricultural production from the use of the quantities of fertilizers given in table 1 are shown in table 12.

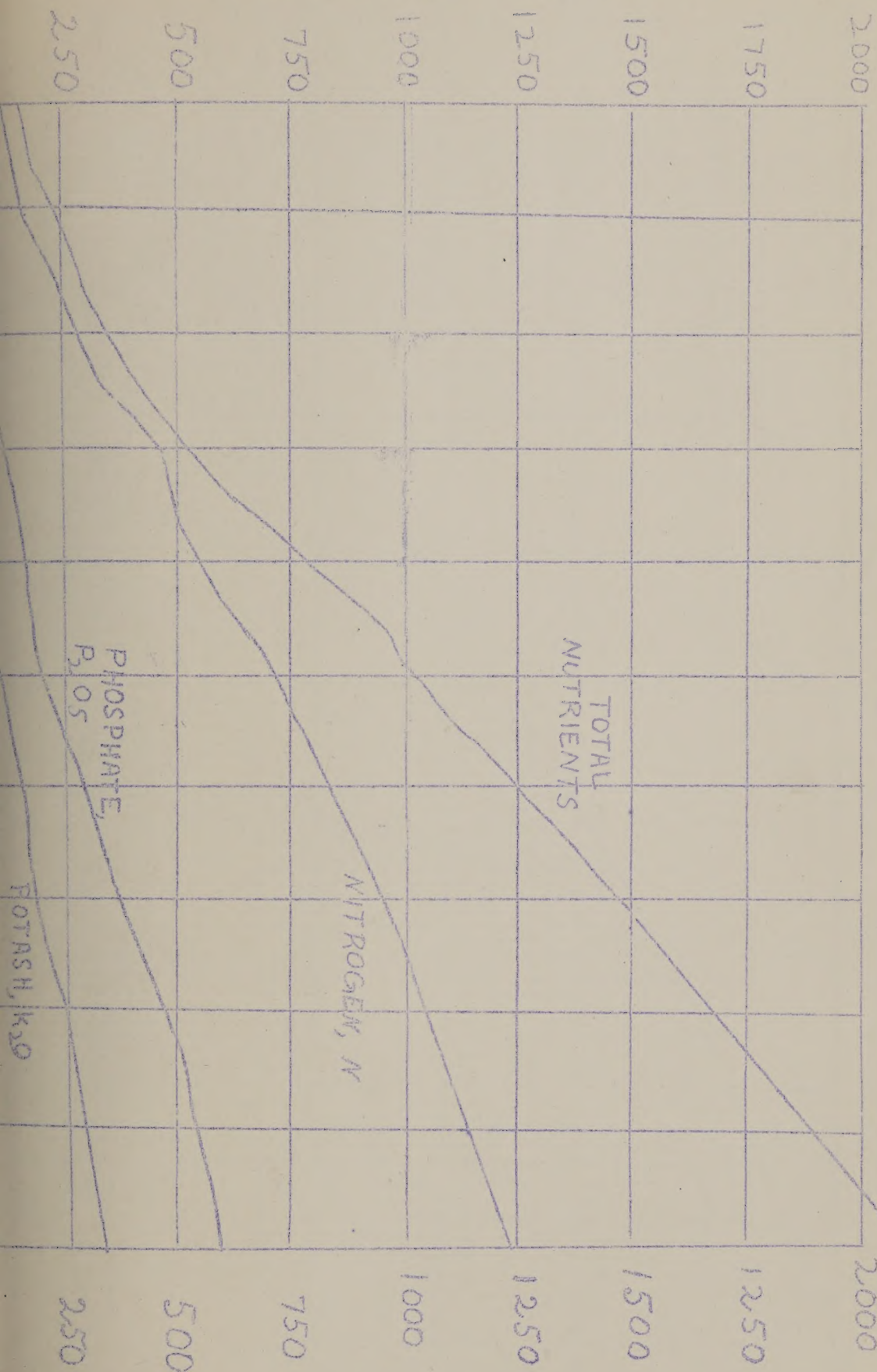
Table 12

Increased crop production from fertilizers
(million)

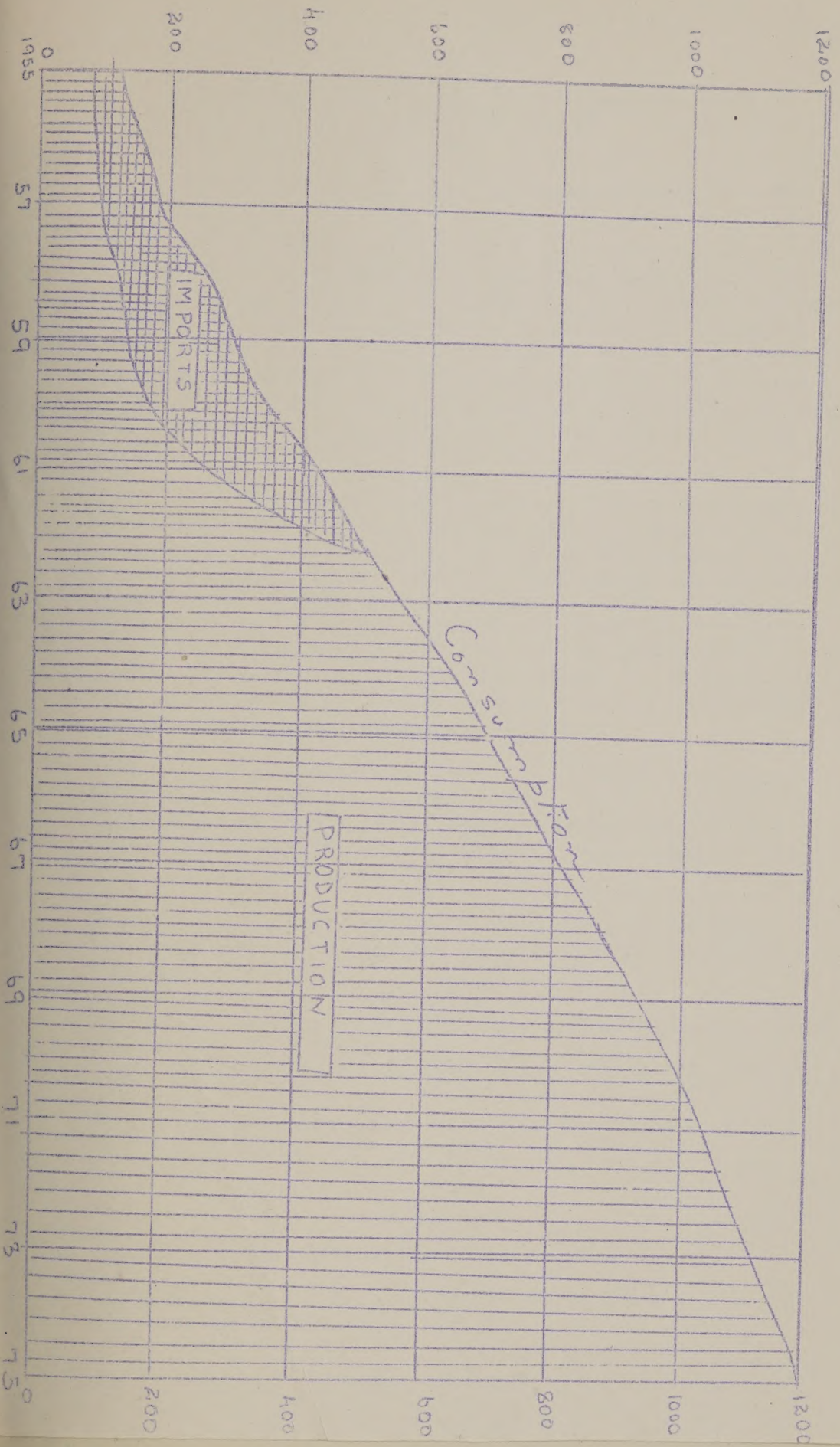
Year	Grain Tons	Value \$	Straw tons	Value \$	Total value \$
1958	3.32	278.88	6.64	44.16	323.04
1959	4.19	351.96	8.38	47.34	399.30
1960	5.30	445.20	10.60	59.89	505.09
1961	6.40	537.60	12.80	72.32	609.92
1962	7.55	634.20	13.10	74.00	708.20
1963	8.70	730.80	17.40	98.31	829.11
1964	9.93	834.12	19.86	112.21	946.33
1965	11.10	932.40	22.20	125.43	1057.83
1970	17.60	1478.40	35.20	198.88	1677.28
1975	22.80	1915.20	45.60	257.64	2172.84

1000 METRIC TONS

FERTILIZER REQUIREMENTS 1966-1975



NITROGEN FERTILIZER CONSUMPTION, IMPORTS & PRODUCTION



FERTILIZERS IN THE INDO-AMERICAN TECHNICAL
ASSISTANCE PROGRAM

F.W.Parker, L.A.Dean, R.H.Engle and G.R.Muhr 1/

In 1951 India had a population of 360 million people 70 per cent of them engaged in agriculture. Of the 326 million acres of crop land, 51 million was irrigated. Crop yields were very low, the average for rice, wheat and peanuts being less than 700 pounds per acre. Droughts made both 1950 and 1951 bad crop years. In 1951 4,725,000 tons of foodgrains were imported, most of it from the United States under the Special Wheat Loan.

Under these unfavourable conditions India started the First Five Year Plan with the emphasis on agricultural development. The same year the United States Congress provided funds for the Technical Cooperation Administration and 52 million dollars were allotted to India. India's proposals for technical and economic assistance included fertilizer projects. The senior author accompanied a small group of U. S. technicians to India in December 1951 to establish the U. S. Technical Cooperation Mission (TCM) and to develop the Indo-American program.

Stewart's^{3/} summary and analysis of fertilizers and soil fertility research in India, a visit with him in Aberdeen and with Imperial Chemical Industries, London provided useful information about the fertilizer and soil fertility situation in India.

The fertilizer development program that was planned with the Government of India had the following broad objectives:

- i. Imports to help increase agricultural production.
- ii. The development of a modern fertilizer industry.
- iii. A determination of fertilizer requirements and returns from their use.

iv/.....

1/ Members of the U. S. Technical Cooperation Mission to India.

- iv. The creation of a demand for fertilizers.
- v. Provision for a soil testing service.

The progress in achieving these objectives is set forth in the following pages.

Imports:

In 1952 TCM imported 114,750 tons of ammonium sulphate and 10,000 tons of unfamiliar fertilizers including urea, ammonium nitrate, calcium ammonium nitrate, ammonium phosphate and triple superphosphate. This tonnage was for general use, storage experiments, field experiments and extensive fertilizer demonstrations. The U. S. financed import program was continued on a reduced scale in subsequent years. It was replaced by much larger Government of India imports.

In seven years TCM financed, by grants and loans, the importation of 312,800 long tons of nitrogen fertilizers whereas the Government of India has financed the importation of 1,727,930 tons. Beginning in 1957 Indian imports have been limited by lack of foreign exchange and this year imports are 600,000 tons lower than required to meet the demand from cultivators.

In 1958 TCM is financing the importation of 11,000 tons of triple superphosphate and other high analysis phosphates to introduce these lower cost fertilizers on an extensive scale. The Government of India will probably import more of these fertilizers in 1959 and their use should steadily increase.

Development of Fertilizer Industry:

Sindri, India's first large nitrogen fertilizer plant, started operations in November 1951. It now produces 330,000 tons ammonium sulphate per year, but production costs are rather high because of the cost of some of the raw materials.

One of the first steps in the fertilizer industry development program was to arrange for three senior Indian officials and a representative of the National Academy of Sciences to make a study of the fertilizer industry and processes in Japan, Canada, United States and Europe.

1/

2/

Their report and that of Mukherjee who made an extensive study in the United States and Europe in 1956, have helped guide the development of the industry. All four men are still in positions of responsibility with respect to the industry's development.

India now has, under construction or in an advanced planning stage, new nitrogen plants with a combined capacity of 320,000 tons N per year. This year 47,000 tons N as ammonium sulphate nitrate and urea comes into production as an expansion of Sindri. A 70,000 ton N plant to produce calcium ammonium nitrate is under construction. Two additional plants to produce 80,000 tons nitrogen as urea and 120,000 tons as calcium ammonium nitrate are in advanced planning stage with bids having been received for the latter. When all of these plants have been completed the country will have a capacity of 420,000 tons nitrogen. Tentative plans have been developed for an additional 400,000 tons. Some of this should be under construction by 1960.

India has a superphosphate industry with a capacity of 50,000 tons P_2O_5 . All raw materials are imported; the phosphate rock from the Middle East or North Africa, the sulphur from the United States. This makes the cost of production high. Triple superphosphate can be imported from the United States at about 60 per cent of the factory price of P_2O_5 in superphosphate produced in India. Imported high analysis phosphates, therefore, may be the most economical means of meeting India's large need for phosphate fertilizers.

The best prospect for the economic production of phosphate fertilizers in India seems to be one of the nitric acid processes. Studies of several of these processes are in progress and plans for a plant are being developed.

All potash is imported as local production is limited to a little potassium nitrate and some muriate of potash from salt brines.

The manufacture of mixed fertilizers is small and is used chiefly for plantation crops such as tea and coffee. The demand for mixed fertilizers for other crops will doubtless increase now that the need for phosphorus and potash as well as nitrogen in a balanced fertilizer program is well established and increasingly recognized.

The growth of the fertilizer industry is reflected in the formation of the Fertilizer Association of India in 1955. It has a professional staff of six; publishes a monthly "Fertilizer News" and work effectively with the public and the Central and State Governments.

The Government of India have taken appropriate steps to provide for the inspection and control of fertilizers. The Fertilizer Control Order of 1957 provides for the collection and analysis of fertilizer samples at fertilizer plants or in channels of trade, and for establishing approved grades. The operation and enforcement of the Control Order is a function of the State. A related activity is the standardization of definitions and terms by the Indian Standards Institute.

Research on Fertilizer Requirements:

The research program was planned to determine:

- a. The storage properties of new fertilizers.
- b. The relative efficiency of new nitrogen fertilizers especially urea and ammonium nitrate.
- c. The need for phosphorus and potash.
- d. The return from different rates of fertilization.
- e. Methods for use in soil testing.

Twelve months storage trials were conducted at twenty locations under both good and poor storage conditions. Results indicated that prilled and conditioned urea and ammonium nitrate properly packaged could be satisfactorily stored under almost any climatic condition encountered in India.

In field experiments the emphasis was on simple six-plot trials on cultivators' fields; about 2000 trials per year. More complex experiments concerned with rates, placement, time of application and residual value were conducted on eighteen leased fields. Supporting laboratory and greenhouse work was conducted at the Indian Agricultural Research Institute.

The results of each of the three years field experiments have been published and consolidated reports for rice and wheat are in the press. The major results of this work have been:

- i. The need for phosphorus is quite general and the return from its use is as good as from nitrogen.
- ii. Phosphates have a good residual value.
- iii. Urea and ammonium nitrate produce substantially the same increase in yields as ammonium sulphate.
- iv. One pound of nitrogen will give an increase of about 12 pounds of grain. The reason for this low return has not been fully developed.
- v. The need for potash is more localised and therefore substantially less than for nitrogen or phosphorus.
- vi. Satisfactory methods have been tested and selected for use in soil testing laboratories.

The Indo-American fertilizer trials were discontinued in 1957 but the field experiments are being continued on an even more extensive scale by the Indian Council of Agricultural Research. There will be several thousand nine-plot experiments on cultivators' fields each year. Complex experiments will be conducted at thirtyfour centers.

Creating a Demand for Fertilizers:

Probably the world's largest fertilizer demonstration program was conducted during 1954-56. There were about 200,000 three-plot demonstrations each year. Yields were taken on many of them and results from 50,000 demonstrations were summarized and published by districts, states, soil classes and years. The data generally confirm the findings of the controlled fertilizer experiments. The chief result of these demonstrations has been to make the cultivators fertilizer conscious and to create a demand for fertilizers that has not been fully supplied since 1955.

The initial three-year fertilizer demonstration program terminated in 1957. It is being followed by an equally comprehensive three year program financed by the Government of India. The United States is providing technical assistance.

The effect of the Indo-American fertilizer program is best measured by a few figures on fertilizer consumption and targets.

Nitrogen consumption has increased from 58,700 tons in 1951 to 186,000 (*) tons in 1958. The demand in 1958 is estimated at 300,000 tons. The target for 1960 is 500,000 tons and for 1965, 1,000,000 tons. Unless imports can be increased and new plants built the 1960 and 1965 targets will not be met. New nitrogen fertilizers are being readily accepted. This year India will use 83,000 tons of urea, 110,000 tons of ammonium sulphate-nitrate and 45,000 tons of calcium ammonium nitrate. Forty per cent of the nitrogen will be from new sources introduced under the Indo-American program. All new plants will produce the newer lower cost fertilizers.

Phosphorus consumption has increased from 6,900 tons P_2O_5 in 1951 to 33,000 tons in 1958. This year for the first time the domestic industry will operate at almost full capacity. The target of 150,000 tons in 1960 and 500,000 tons in 1965 reflects the recognized need more than the current and assured demand as in the case of nitrogen. The demand will be created by the demonstration program in progress.

European potash producers have been conducting good research and demonstrations in selected areas in co-operation with Indian agencies. To a considerable degree the increase in potash consumption reflects their work. Consumption has increased from 6,575 tons K_2O in 1951 to 24,000 tons in 1958. Targets for 1960 and 1965 are 50,000 and 150,000 tons respectively.

..7

(*) This and subsequent figures for 1958 are firm estimates based on the supply of fertilizers.

The 350 per cent increase in consumption of plant nutrients from 1951 to 1958 was achieved without the benefits of subsidies or low prices. As a matter of fact, nitrogen and phosphorus prices in India are much higher than in the United States. Ammonium sulphate, and 16 per cent super-phosphate retail at \$80.00 and \$52.00 per ton respectively. Substantial reductions in fertilizer prices may be anticipated with the construction of new plants and importation of high analysis phosphates. Such reductions will do a great deal to stimulate increased consumption.

India is well started on a good fertilizer production, import and consumption program. The Government of India has invited the participation of foreign capital in the industry. European, Japanese and United States companies are showing increased interest in the market and industry. Within ten years India will both produce and consume large quantities of fertilizers. The major problem will be to assure its increasingly effective use. One way of doing this is through a soil testing service.

Soil Testing Service:

The Indo-American fertilizer program included provision for the establishment of a nation-wide soil testing service. After research was well started the decision was made to have twenty-four soil testing laboratories. Sixteen laboratories are fully staffed and in operation. The other eight will be operating within six months. Each laboratory was planned to handle 1,000 samples per month and a few have reached that number. A mobile soil testing van is going from State to State to help arouse interest in the service and to demonstrate the service to cultivators. All laboratories use essentially the same methods. They include methods for saline and alkaline soils as well as for nutrients. Standard soil samples are sent to all laboratories for check analysis from time to time. Reporting is on a uniform basis and provision is made for the preparation of soil testing summaries and maps. These laboratories were initially financed by United States Technical Cooperation Mission and the Central Government and developed in cooperation with the States. At the end of three to five years they will be turned over to the States for administration and operation.

The Indo-American fertilizer program should be completed in 1960. The United States will have contributed about twenty man years of technicians service. Twenty participants will have studied in the United States and other countries. The United States by grants or loans, will have financed the importation of 325,000 tons of fertilizers. In all elements of the program the Indian contribution has been many times greater than that of the United States. The substantial results achieved and the greater results in prospect were only made possible by the effective cooperation of the two nations.

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New Delhi
July 1, 1958

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Impact Of Fertilizer Extension Programme On The Minds Of The Farmers And Their Reactions To Different Extension Methods

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One of the major causes of low crop yields in India is inadequate supply of plant nutrients through manures and fertilizers. This is evident from the fact that the fertilizer consumption in India is much low compared with other countries.

Fertilizer consumption in different countries in lb/acre

(Averaged over all field and vegetable crops)

	N	P ₂ O ₅	K ₂ O	Total
India	0.69	0.09	0.06	0.84
U.S.A.	8.19	9.50	7.27	24.96
Egypt	40.76	5.46	1.10	47.32
U. K.	29.02	41.93	30.83	101.88
Japan	88.53	42.33	64.78	195.64
Netherlands	153.15	89.87	130.44	373.46
New Zealand	8.37	376.50	41.82	426.64
World (Excl. USSR and China)	5.00	5.84	4.64	15.44

Judicious use of fertilizers have been considered as one of the quickest means of achieving increased food production. Attempts have been made to step up food production by use of fertilizers since the launching of Grow More Food Campaign. In view of the urgency of producing additional food grains a drive for intensifying the use of fertilizers as an immediate step in this direction was launched in July 1956.

A scheme of "Fertilizer Demonstration Trials on cultivators fields" on all important food and cash crops throughout the country was launched by the Government of India in March 1954. The main objectives of these demonstrations were to (i) make cultivators fertilizer-minded, (ii) encourage more extensive use of fertilizers as one of the effective means of increasing crop yields, and (iii) introduce new commercial fertilizers which are expected to be manufactured in India in the near future. Under this scheme fertilizers were supplied free to the cultivators. It is estimated that about 4 lakhs demonstrations were laid out during 1956-57.

It is now time to evaluate the results of this Fertilizer Extension Programme and study the impact of this programme on the minds of the cultivators and their reactions to different extension methods, used to popularize the use of fertilizers.

PROCEDURE OF EVALUATION

For this study two Extension Service Blocks namely Nagpur and Balapur (Nagpur located in Nagpur District and other Balapur located in Akola district) were selected. These blocks are representative of Vidarbha region of Bombay State.

The first block is situated on the south east of Nagpur which is the headquarter of this block. The soil is medium black of trap and gneissic origin with loamy texture having adequate underground water for lift irrigation from surface wells. Wheat, *Jowar* and Chillies are the main crops of this block. Cotton, linseed, sesemum, oranges, vegetables and paddy are also grown but on a smaller scale. The average yields of these crops are rather low. However, the cultivators of this block are socially more conscious as they reside near Nagpur City.

The second block is situated in Balapur taluka of Akola district. Balapur is the headquarter of the block. The soil is medium black derived from trap and gneissic origin. Underground water level is deep, still a few acres are irrigated with water lifted from deep surface wells. *Jowar* and cotton are the main crops, while chillies, ground nut, banana, sugar cane and vegetables are also grown but on a smaller scale.

The list of the cultivators who purchased the fertilizer on tacavi (loan) and on cash payment and the cultivators to whom the fertilizer was supplied free for demonstrations was available with the Agriculture Extension officers of both the blocks. The entire group of cultivators who used the fertilizer for application to soil for crop during one or more seasons was chosen as the population for Nagpur block. No sampling procedure was adopted. Thus the total number of cultivators on the compiled list from 1954-55 to 1957-58 was 314. As the author had to conduct a survey during a short time in Balapur block the sample was drawn from the population of 693 cultivators who used the fertilizer during 1956-57 only. Every seventh case at regular interval was selected (Young 1956). Thus 99 cases were selected for interviewing in Balapur block.

Out of the selected cases 255 from Nagpur block and 82 cases from Balapur block were interviewed. Rest of the cases did not cooperate. Some of them were afraid to give information while some gave negative answers to all questions, a few of them were out of the village and a few were female cultivators.

A schedule was prepared in regional language (Marathi). The cultivators were interviewed and schedules were filled in. The help of the Gram Sevak in-charge of the respective village was sought to make acquaintance with the cultivators.

Besides the tabulated data from the schedules, full use was made of the records maintained by the Gram Sevaks and the Agriculture Extension Officers.

OBSERVATIONS.

(a) *Use of Farm Yard Manure :-*

All the cultivators except one (in Balapur Block) applied farm yard manure as the basal dose before the application of fertilizer to their fields. The average rate of F. Y. M. per acre was 1.47 cart loads in Balapur block and 0.61 cart loads in Nagpur block, whereas the Department of Agriculture recommends the use of at least 5 cart loads of F. Y. M. per acre. Some cultivators used other manures like green manures fish manure, poudrette, oilcakes and tank silt.

TABLE 1

Number of cultivators using bulky organic manures other than Farm Yard Manure.

Type of manure	Balapur block	Nagpur block	Total
1. Green Manuring	13	73	86
2. Fish manure	4	2	6
3. Poudrette	8	16	24
4. Oil cakes	3	1	4
5. Tank silt	—	1	1
Total	18	93	121

It is easier for bigger land holders to maintain bullocks and cattle and prepare F. Y. M. Contrary to this in one village-Gumthala in Nagpur block, where detailed study was conducted it was found that out of 901 cartloads of F. Y. M. only 71 cartloads of F. Y. M. was prepared by the cultivators and 830 cartloads of F. Y. M. was prepared by non-cultivators who sold the manure to the cultivators of the same village. Cattle population of that village was 866 (including goats). Non-cultivators also maintained about one or two cattles per head. The total requirement as per cultivator's demand of this village was 1,900 cartloads of F. Y. M. Thus the quantity of F. Y. M. produced was much less than the demand. Other organic manures are used by a few cultivators. Thus the deficiency of plant nutrients which is not fulfilled by organic manures should be met by using fertilizers.

When 337 cultivators, who were interviewed, were asked whether they could get F. Y. M. in adequate quantities, their replies were as follows.

TABLE 2

Availability of F. Y. M. to cultivators.

	Balapur Block	Nagpur Block	Total	Per cent of cases
Adequate	8	10	18	5.34
Not sufficient	71	233	304	90.21
No answer given	3	12	15	4.45
No. of cases	82	255	337	

Only 5.38 per cent cultivators informed that they could apply F. Y. M. to their fields in sufficient quantities, while about 90% cultivators were of the opinion that they could not get sufficient quantity of farm yard manure, which should be supplemented by using fertilizers.

(b) Use of Fertilizers.

1. Total No. of cultivators using fertilizers.

Considering all the cultivators of both the blocks, it was found that very small

number of cultivators used the fertilizer and in some villages of Balapur block no fertilizer was consumed by the cultivators. The consumption of various fertilizers during 1954-55 to 1957-58 is given in table 3.

TABLE 3

No. of cultivators using different types of fertilizers

Ammonium Sulphate.

Year	Balapur block		Nagpur Block		% age of Total
	No. of villages tackled	Cultivateors benefited Number	No. of villages tackled	cultivateors benefitted Number	
1954-55	42	506	36	158	5.89
1955-56	48	577	48	292	10.89
1956-57	43	697	48	214	7.98
1957-58	46	800	48	138	5.14

Superphosphate

1954-55	—	—	—	—	—
1955-56	22	102	—	—	—
1956-57	20	284	—	—	—
1957-58	15	132	—	—	—

Urea

1957-58	10	10	—	—	—
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Ammonium Sulphate Nitrate

1957-58	5	20	—	—	—
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Though the number of cultivators using fertilizer are increasing every year in Vidarbha very few are consuming other than ammonium sulphate. The number of cultivators using superphosphate is very small. The main reason of this anomaly is that the cultivators have not yet understood the importance of phosphorus in plant nutrition. A few cultivators have applied urea to their crops. On enquiry it was found that all of them observed the same efficiency of urea compared to ammonium sulphate.

2. Quantity of fertilizers consumed.

Taking 1954-55 as the base year, it was observed that out of 85 randomly selected cultivators from the list, 20 (23.5%) cultivators used the same quantity of fertilizer every year, 26 (30.58%) cultivators used more fertilizer and 39 (45.88%) cultivators used less quantity of fertilizer than they used during 1954-55.

The average rate of fertilizers applied per acre worked out to be 4.25 lb. of ammonium sulphate in Balapur block and 2.15 lb. ammonium sulphate in Nagpur block.

3. Continuity in the use of Fertilizer.

The survey of the position with reference to continuity of the use of fertilizers is given in table 4 as under:-

TABLE 4

Continued use of fertilizers by the same cultivators.

Cultivators who used the fertilizer for	Percent of Farmers	
	Balapur block	Nagpur block
One year only	54.54	67.63
Two years (continuous)	16.13	14.20
Three years ,,	9.62	4.99
Four years ,,	—	1.92
Five years ,,	—	0.19
Two years with one year gap	14.68	7.10
Two years with two year gap	—	1.92
Irregularly (No continuity)	—	1.92

Large number of cultivators who have once used the fertilizer did not continue the use of fertilizer. This situation seems to be unusual. In fact, if these cultivators have noted that the crop yield is definitely increased with the application of fertilizer to the soil, they should not have normally stopped using fertilizer.

4. Factors Influencing the consumption of Fertilizer by the cultivators.

1. *Age* : The age of the cultivator had a considerable influence on the consumption of fertilizer. This is evident from the data given in table 5.

TABLE 5

Use of fertilizers in relation to age of cultivators

Age Group	Balapur Block	Nagpur Block	Total	% of cultivators using fertilizer.
20 and under years	—	3	3	0.89
21 to 25 years	4	12	16	4.75
26 to 30 years	10	35	45	13.35
31 to 35 years	13	50	63	18.69
36 to 40 years	12	44	56	16.62
41 to 45 years	16	32	48	14.24
46 to 50 years	11	26	37	10.98
51 to 55 years	10	22	32	9.49
56 to 60 years	3	17	20	5.93
61 and over years	3	14	17	5.04
No. of cases	82	255	337	

The percentage of cultivators reporting the adoption of using fertilizer are higher for the 31 to 35 and 36 to 40 year groups than for the younger and older groups.

2. Educational training received by the cultivators.

Quite a different picture is presented when cultivators are arrayed on the basis of previous educational training.

TABLE 6
Adoption of fertilizer in relation to educational training

Educational status of the cultivators.	Balapur Block	Nagpur block	Total	% of cases.
Illiterate	6	86	92	27.30
Primary	26	123	151	44.80
Middle School	33	26	59	17.52
High School	13	6	19	5.64
Matric passed	2	9	11	3.26
Under Graduate	—	5	5	1.48
Graduates	—	—	—	—
Total	82	255	337	100.00

About 73% of the cultivators who adopted the use of fertilizer are literate. The number of illiterate farmers using fertilizer was very small (7.31%) in Balapur block. A significantly higher proportion of those with primary education (44.69%) reported the use of fertilizer than those with middle school, high school or college training, while the middle school group in Balapur block was in turn slightly superior to the group with primary education. This indicates that the degree to which cultivators expose themselves to improved agricultural practices is likely to be proportionate to their educational training when they are of 26 to 45 years of age.

3. Size of holding and Tenure.

The percentage of cultivators adopting the use of fertilizer tend to increase with the bigger size of land holding as indicated in table 7.

TABLE 7
Adoption of fertilizers in relation to size of holding

Size of holding	Total area cultivated			Total area owned		
	Balapur	Nagpur	Total	Balapur	Nagpur	Total
1 to 5 acres.	2	15	17	1	24	25
6 to 10 acres	5	29	34	9	38	47
11 to 15 acres	14	29	43	16	18	34
16 to 20 acres	12	32	44	9	31	40
21 to 25 acres	7	24	31	5	21	26
26 to 50 acres	18	73	91	15	57	72
51 to 75 acres	9	27	36	7	24	31
76 to 100 acres	7	13	20	7	12	19
101 to 150 acres	4	12	16	3	11	14
151 to 200 acres	3	1	4	3	2	5
201 and above	1	—	1	3	—	3
No. of acres	82	255	337	78	238	316

Most of the cultivators who consumed fertilizer were owner cultivators. There were only 4 tenants in Balapur block and 17 tenants in Nagpur block who used the fertilizer. Amongst the rest of the cultivators there were many cultivators who were holding lands on rent in addition to the land they owned. But most of them were not inclined to use the fertilizer or F. Y. M. on the land which was cultivated on rent.

4. Irrigation facilities.

Out of 82 cultivators, 19 cultivators of Balapur block and out of 255 cultivators 97 cultivators of Nagpur block could irrigate a part (a few acres) of their holding. The distribution of irrigated land is as follows :-

TABLE 8

Availability of irrigation.

Grade of holding	No. of cultivators,	
	Balapur block	Nagpur block
1 to 5 acres	13	79
6 to 10 acres	4	12
11 to 15 acres	2	5
16 to 20 acres	—	1
21 and above acres	—	—

Thus the larger area could not get assured supply of irrigation, if rain fails or there are longer breaks. This is a big limitation in using increased doses of fertilizer. For example, during 1957-58 season rainfall in September was rather inadequate. No rainfall was received during October and November. The application of fertilizer encouraged the growth of crops which required naturally more soil moisture. Thus the encouraged growth could not cope up with the available soil moisture. This condition was particularly harmful for cotton. Growth of the fertilizer applied crop was very good and could have yielded a very good harvest provided soil moisture was adequate. But due to lack of soil moisture during later stage whole crop along with immature cotton bolls dried. The farmers could not do anything. The yield of cotton from the fertilizer applied crop was much low than the non-fertilized crop.

5. Socio-economic Status

It was observed that the cultivators who were members of Gram panchayat, village leaders and village officials, even the lowest village official Kotwal, used more fertilizer as is seen from table 9. They are often economically in a better position compared with other cultivators of the village.

Cultivators having subsidiary occupation were found more likely to adopt the use of fertilizer. This might be due to better financial conditions of these farmers.

(Table No. 10)

22.45% cultivators were having some business in addition to farming.

TABLE 9

Adoption of fertilizer practices in relation to social status

Social status.	Balapur	Nagpur	Total	% of cases.
Grampanchayat members	33	50	83	24.63
Village leaders	25	29	54	16.02
Village Officials	4	7	11	3.26
Others	20	169	189	56.08
No of cases	82	255	337	56.08

TABLE 10

Adoption of fertilizer in relation to subsidiary occupation

Subsidiary Occupation.	Balapur	Nagpur	Total	% of cases.
Trading	8	15	23	6.82
Service	6	29	35	10.39
Money Lending	—	2	2	0.59
Dairy	—	15	15	4.45
Farming only	68	195	262	77.74
No. of cases	82	255	337	

6. Cost of Fertilizer.

All the cultivators covered under this investigation were asked whether the cost of the fertilizer was high. Their replies are tabulated in table 11.

TABLE 11

Cost of Fertilizer

Opinion of cultivator	Balapur	Nagpur	Total	% of cases
Cost is high	70	197	267	79.23
Cost is not high	10	42	52	15.43
No answer given	2	16	18	5.34
No. of cases	82	255	255	

Out of the 337 cases studied in detail, 79% of the cultivators felt that the cost of the fertilizer was high in relation to the extra profit they expected to derive from the use of fertilizer. But it is surprising to note that about 75 per cent of the cultivators were still willing to purchase the fertilizer, as is evident from the data in table 12.

TABLE 12

Willingness to purchase the fertilizer

	Balapur block	Nagpur block	Total	% of cases.
Willing to purchase	78	174	252	74.78
Not willing to purchase	3	61	62	18.99
No answer given	1	20	21	6.23
	82	255	337	

About 19 per cent of the cultivators were not willing to purchase the fertilizer. The rest about 6 % were rather undecided.

Application of fertilizer*1. Method of application of Fertilizer.*

It was found that the farmers of this region adopt different methods of the application of fertilizer. Out of these two methods drilling method was mostly preferred (Table 13).

TABLE 13

Methods of fertilizer application followed

Methods of application	Balapur block	Nagpur block	Total	Percent of cases
Broadcasting	28	61	90	26.71
Drilling	54	143	197	58.46
Both methods	—	51	50	14.83
	82	255	337	

Choice of method

	Balapur block	Nagpur block	Total	
Broadcasting	17	38	55	16.32
Drilling	33	110	143	42.43
No choice	32	107	139	41.25
	82	255	337	

More than 50 per cent of the farmers are already drilling their fertilizer in the soil. Half that number are still broadcasting. About 15% of the farmers are still undecided about the correct method of application of fertilizer.

When asked which method would be more suitable between the two, 42 per cent cultivators gave preference to drilling method, 16 per cent of the cultivators gave preference to broadcasting method and 41 per cent indicated no preference between the two.

2. Time of application of fertilizer.

The cultivators of this region apply fertilizer to the crops at the time of sowing, before sowing and after sowing (top dressing). All of them applied the fertilizer in a single dose. The major group of cultivators applied the fertilizer as a top dressing to crops.

TABLE 14

Time of application of fertilizer,

Time of application	Balapur block	Nagpur block	Total	% of cases
Before sowing	7	25	32	9.50
At sowing	30	45	75	22.26
Top-dressing	45	157	202	59.94
No answer given	—	28	28	8.31
	82	255	337	

Most suitable time for application of fertilizer.

Time of application	Balapur block	Nagpur block	Total	% of cases
Before sowing	6	16	22	6.53
At sowing	23	23	46	18.65
Top dressing	22	115	137	40.65
All (selection as necessity arises)	—	2	2	0.59
No answer given	31	99	130	33.58
	81	255	337	

When asked to state their choice for the time of application of fertilizer 41 per cent of the cultivators gave preference for application of fertilizer as a top dressing.

Crops

1. Crops to which the fertilizer was applied.

Cash crops get the major share of the fertilizer. Cotton is the cash crop of Balapur block and chillies is the cash crop of Nagpur Block. Groundnut being another cash crop in the Balapur block, did not receive fertilizer, as cultivators did not feel any need of applying fertilizer to groundnut crop. But grain crops had some share in the consumption of fertilizer.

TABLE 15

Fertilizer application to different crops

Crops.	Balapur	Nagpur	Total	% of cases
Cotton	74	90	164	48.66
Chillies	44	235	279	82.79
Jowar	55	181	236	70.03
Wheat	11	64	75	22.26
Vegetable	20	52	72	21.36
Fruit trees	15	21	36	10.68
Sugar cane	13	4	17	5.04
Arhar	—	8	8	2.37
Paddy	1	3	4	1.18
Tobacco	—	1	1	0.30
No. of cases	82	255	337	

From 337 cases of cultivators studied in this investigation, it was found that 82 per cent of the cultivators used the fertilizer for chillies, 70 per cent for *jowar* and 48 per cent used it for cotton. In Balapur 90 per cent of the cultivators used the fertilizer for cotton.

Cultivators' experience about fertilizer use

1. Suitability of fertilizer.

The Cultivators who were interviewed (337) were asked to state the crops to which the applications of fertilizer was considered profitable. Their replies are given in table 16.

TABLE 16

Cropwise application of fertilizer considered profitable

Group	Balapur block	Nagpur block	Total	% of cases.
<i>Jowar</i>	32	111	163	48.37
Chillies	14	311	125	37.09
Cotton	43	63	106	31.45
Wheat	5	39	44	12.06
Vegetable	4	34	38	11.28
Fruit trees	4	8	12	3.56
Sugar cane	4	—	4	1.18
Paddy	1	6	7	2.08
Arhar	—	8	8	2.37
All Crops	12	15	27	8.01
Irrigated Crop	12	8	20	5.93
Not economical for any crop	1	5	6	1.78
No. of cases	No. of cases	255	337	

After having experience of using fertilizer, very few cultivators felt that the application of fertilizer to crops was not profitable (1.77%). But considerably large number of cultivators said that the application of fertilizer was profitable to one or the other crops.

2. Harmful effect of fertilizer on crops.

It is said that the cultivators are prejudiced for the fertilizer having corrosive effect on the crops. The cultivators were asked to state whether the fertilizer had a corrosive effect on their crops. Their replies to this question are tabulated below :-

TABLE 17

Harmful effect of fertilizer on crops

Cultivators' opinion	Balapur block	Nagpur block	Total	% of cases.
Corrosive effect	11	41	52	15.43
No corrosive effect	57	188	245	72.70
No answer given	14	26	40	11.87
No. of cases	82	255	337	

Out of 337 cultivators questioned, 73 per cent cultivators said that the fertilizer had no corrosive effect on crops. The adverse effect was expressed by about 15 per cent of the cultivators.

3. Effect of fertilizer on the soil.

About 22 per cent cultivators said that the fertilizer had a bad effect on the soil. They reported that soil tilth was destroyed and soil became hard after the application of fertilizer. But 75 per cent cultivators could not see any such bad effect of fertilizer on the soil as seen below.

TABLE 18

Effect of fertilizer on the soil

	Balapur block	Nagpur block	Total	% of cases
Bad effect	19	55	74	21.96
No harmful effect	54	200	254	75.37
No answer given	9	—	9	2.67
No of cases	82	255	337	

4. Soil suitable for application of fertilizer

The cultivators were asked to state to which soil, fertilizer should be profitably applied. Their replies are tabulated below :-

TABLE 19

Soil suitable for application of fertilizer

Type of soil	Balapur block	Nagpur block	Total	% of cases
Heavy soil *	42	64	106	31.45
Medium soil *	50	163	213	63.20
Light soil *	10	53	63	18.69
Irrigated	32	137	169	50.15
Water-logged	2	—	2	0.59
All types	21	22	43	12.76
No of cases	82	255	337	

*grade of fertility (Some cultivators have given more than one choice of soil type)

Half of the cultivators stated that the fertilizer should be applied, where assured supply of irrigation water is available, 63 per cent of the cultivators said that the fertilizer could be profitably applied to medium soils, half of them (31 per cent), reported that it should be applied to heavy soils and about quarter of them said that it should be applied to light soils.

5. Rainfall in relation to the use of fertilizer.

The cultivators were asked whether the fertilizer should be applied, if rainfall is less than normal. Three quarters of the cultivators gave negative answers to this question. This question was put just to know how many cultivators have understood the interrelationship between fertilizer use and rainfall.

Some of the cultivators expressed their opinion voluntarily in addition to the above replies. They said that the fertilizer may be applied if the rainfall is less than normal, provided— 1. that the soil is heavy (retentive of moisture) (1), 2. that the quantity of fertilizer to be applied is reduced (16), 3. that the assured supply of irrigation water is available (7), 4. that the fertilizer is applied and mixed with the soil at the time of sowing (3) and 5. that the rainfall is received timely (1) (Figures in bracket indicate the no. of cultivators who expressed the same opinion)

TABLE 20

Cultivators' opinion regarding the use of fertilizer in relation to rainfall

Answer	Balapur block	Nagpur block	Total	% of cases
Affirmative	12	39	51	15.13
Negative	58	195	253	75.07
No answer given	12	21	33	9.79
No. of cases	82	255	337	

Consumption of fertilizer in relation to the season and market rates of commodities.

It is evident from the following table that the season had no relation to the consumption of fertilizer. Unfavourable season did not decrease the consumption of fertilizer in the next year. Although the seasons were unfavourable during 1953-54 and 1955-56 the quantity of fertilizer distributed to cultivators and the number of cultivators (see table No. 3) who purchased, was not reduced during 1955-56 or 1956-57.

TABLE 21

Effect of seasonal climate and market rates of commodities

Year	Rainfall (inches)	Season	Balapur Block Average yield of crop in lb.	Anna Valua- tion	Marker rates of main co- modities (Akola market)	Total consumption of ammonium sulphate tons Qrts
1953-54	—	for cotton unfavour- able for <i>Jowar</i> fav- ourable	192	-/8.0/-	Rs. 825/- per bale	218-8
			526	-/10.0/-	Rs. 51/- per Khandi Rs. 700/- per bale	231-2
1954-55	29.65	—do—	255	-/9.5/-	Rs. 33/4 per Khandi Rs. 715/- per bale	241-8
			553	-/10.5/-		
1955-56	35.43	—do—	142	-/6.5/-	Rs. 37/- per Khandi — —	241-14
			459	-/8.5/-		
1956-57	37.12	—do—	459	-/6.0/-	Rs. 31/8 per Khandi	
			—	-/8.0/-		

The market rates of cotton and *jowar* come down considerably during 1954-55 and 1955-56 than the rates prevailing during 1953-54. But this reduction in rates of commodities had no effect on the consumption of fertilizer.

Extention methods that influenced adoption of fertilizer use

1. Fertilizer Demonstrations.

The fertilizer demonstrations are conducted on the cultivators' fields. The fertilizers are supplied free of cost to the cultivators for these trials. These fertilizer demonstrations have proved useful, though their effectiveness is much less. This is evidenced from the following data :-

There were a few fertilizer demonstration in Wadeoan circle (Gramsevak's circle) of Balapur block comparing with large no. of fertilizer demonstrations in Nagpur block. In Wadeoan circle of Balapur block nearly 3 per cent cultivators had not purchased fertilizer, though fertilizer trials were conducted on their farms and they could closely observe the good result of fertilizers. Nearly 7 per cent cultivators purchased the fertilizer after observing the results of fertilizer demonstrations on their farms. Contrary to this nearly 90 per cent cultivators purchased the fertilizer though fertilizer demonstrations were not conducted on their farms.

In Nagpur block 60 % of the cultivators had not purchased the fertilizer though

TABLE 22

Effectiveness of fertilizer demonstrations

Classification group	Per cent of farmers	
	Balapur block	Nagpur block
1. Cultivators who never purchased fertilizer, though fertilizer demonstrations were conducted on their farms.	3.31	59.97
2. Cultivators who purchased fertilizer on Tacavi after fertilizer demonstrations were conducted on their farms.	7.28	20.42
3. Cultivators who purchased fertilizer on cash payment after fertilizer demonstrations were conducted on their farms.	—	1.10
4. Cultivators who purchased fertilizer on cash and on Tacavi after fertilizer demonstrations were conducted on their farms	—	1.10
5. Cultivators who purchased fertilizer on Tacavi, though fertilizer demonstration were not conducted on their farms.	84.73	14.72
6. Cultivators who purchased fertilizer on cash though fertilizer demonstration were not conducted on their farms	4.63	1.28
7. Cultivators who purchased fertilizer on cash and on Tacavi though fertilizer demonstrations were not conducted on their farms.	—	0.92

the fertilizer demonstrations were conducted on their farms. 23 % of the cultivators had purchased the fertilizer when the fertilizer demonstrations were conducted on their farms and 17 per cent cultivators had purchased the fertilizer, though fertilizer demonstration were not conducted on their farms.

2. Indirect Influence.

Passing on of an extension information from neighbour to neighbour is an important consideration in extension teaching. This method was found to have greater effectiveness than any other method in both the blocks, where minority of farmers are illiterate and less educated. The cultivators in the investigations were asked to state the approximate number of cultivators who had adopted using fertilizer after observing neighbour's fertilizer applied field. The data as given by them is presented in table 23.

The cultivators in this investigation were also asked to state whether they have recommended others to use the fertilizer and if so, to how many cultivators and how many of them have adopted the practice.

Nearly half of the cultivators whose cases were studied, recommended others to use the fertilizer and nearly one quarter cultivators had not done so.

DISCUSSION.

Though quite a number of schemes were put forth to promote fertilizer consumption since the inception of Grow More Food Campaign during Second World War, the fertilizer consumption in lb. per acre in India is comparatively very low. The object of this investigation was to find out the causes of this condition.

TABLE 23

No of cultivators influenced by their neighbour.

Classification groups (who were influenced)	No. of cultivators influencing adoption of this practice	
	Balapur block	Nagpur block
1—5	23	80
6—10	19	25
11—15	5	6
16—20	2	2
21—25	3	4
26—30	1	—
31—35	—	—
36—40	1	—
41—50	3	1
Could not tell the number	3	10
Not influenced	22	127
No. of cases studied	82	255

TABLE 24

No. of cultivators recommending to other cultivators the use of fertilizer.

	Balapur block	Nagpur block	Total	% of cases
Recommended	48	115	163	48.37
Not recommended	14	77	91	27.00
Not answered this question	20	63	83	24.63
No of cases	82	255	337	

This is mainly due to the prejudices of cultivators that the fertilizer is corrosive to crops and it had a bad effect on the soil. This shows that the first need is to show to the cultivators how to apply fertilizer to crops by arranging method demonstrations. More emphasis is required on this point. Well illustrated pamphlet or bulletin must be given to a farmer when he purchases the fertilizer.

It was found that the fertilizer demonstrations are not conducted properly and are not as impressive as they should be. These demonstrations are visited and their purpose is understood by small number of cultivators. A comparatively small number of cultivators see these demonstrations at the stage when differences in crop growth are very obvious.

SUMMARY

The field study on the impact of fertilizer extension programme on the minds of

the farmers and their reactions to different extension methods have been made in two block areas of the National Extension Service. From these block areas 337 cases of the farmers were studied in details. The summary of the results is given as under :—

1. All farmers who used the fertilizer were applying farmyard manure as the basal dressing to their fields. The average rate of F.Y.M. per acre was 1.47 cart loads in Balapur Block and 0.61 cartloads in Nagpur block. Nearly 90 per cent cultivators stated that they could not get adequate quantity of F.Y.M.
2. A small number of cultivators were found using fertilizer. Large number of them who had once used the fertilizer did not continue to use it annually. The average rate of application of ammonium sulphate was 4.25 lb. in Balapur block and 2.15 lb. per acre in Nagpur block.
3. The cultivators who used fertilizer were mostly owner cultivators. The percentage reporting the adoption of fertilizer usage was higher for the middle age group who had some educational training and higher socio-economic status. Farm size operated by cultivator was positively associated with the adoption of fertilizer use.
4. 79 per cent of the cultivators stated that the cost of fertilizer was high and yet 75 per cent cultivators were willing to purchase the fertilizer.
5. Drilling method of fertilizer application was found to be more popular. Top dressing of fertilizer was preferred by the cultivators.
6. Cash crops received the major share of the fertilizer purchased. 82 per cent of the cultivators used fertilizer for chillies, 70 per cent used it for *jowar* in both blocks and 90 per cent used it for cotton in Balapur block.
7. Considerably large number of cultivators said that the application of fertilizer to crops was suitable and profitable. 73 per cent of the cultivators stated that the fertilizer had no corrosive effect on crops and could not see any harmful effect of fertilizer on the soil.
8. Medium type of soil was considered by the farmers most suitable for the application of fertilizer. 74 per cent of the cultivators stated that fertilizer should not be used if the rainfall received is less than normal.
9. Seasonal climate and the market rates of commodities had no effect on the consumption of fertilizer.
10. The cultivators who purchased fertilizer after fertilizer demonstrations were conducted on their farms, were 7 per cent in Wadegaon circle of Balapur Block and 23 per cent in Nagpur Block. The cultivators who purchased fertilizer though fertilizer demonstrations were not conducted on their farms were 90 per cent in Wadegaon circle and 17 per cent in Nagpur block. The cultivators who had not purchased fertilizer though fertilizer demonstrations were conducted on their farms were only 3 per cent in Wadegaon circle and 60 per cent in Nagpur block.

11. The number of cultivators who were influenced by their neighbour to adopt the use of fertilizer were much more than those influenced by fertilizer demonstrations.

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KELLOGG
XVIII

ANNUAL REPORT OF THE INTEGRATED SCHEME OF ALL INDIA SOIL
AND LAND USE SURVEY FOR THE PERIOD ENDING 30.6.58

page 38

A scientific survey and classification of the soils of the country is urgently needed for a proper understanding of the kinds of soils existing and their exploitation for maximum advantage and rational land use. Since the practical aspects of soil science depend on certain fundamental concepts about genesis and classification, it is essential to understand how soils are formed and their extent in each region.

The aim of the soil survey is to 1) classify and map the different kinds of soils so that proper management and agricultural use of the soil resources can be planned and 2) apply the result of the research to individual field or tracts of land. With this aim in view the All India Soil and Survey Scheme was started in 1956.

Four zonal centres were set up in four major groups of soils in India viz., (1) Alluvial Soil Zone, 2) Black Soil Zone 3) Laterite Soil Zone and 4) Red Soil Zone. The kind of soil map envisaged in this scheme was of a reconnaissance type generally in the scale of 1" = 1 mile.

With the integration of the All India Soil Survey Scheme with the land use survey and Planning Scheme of the Central Soil Conservation Board since 1-3-1958, all the soil survey have been now centralized under one agency, viz., the Integrated Scheme of All India Soil and Land Use Survey. This has brought a considerable change in the plan of work. The important change is the change of the region from soil basis to geographical basis. The soil survey will now generally be standard detailed soil survey employing a scale of 16" = 1 mile or 8" = 1 mile. ~~Reconnaissance~~ soil survey (1" = 1 mile) will also be occasionally used to fix up the soil type and soil series. Dr. C.E. Kellogg, eminent Soil Scientist from U.S.A. who visited this country, has recommended this arrangement.

The broad objective of the All India Soil and Land Use Survey Scheme are both basic and applied. The basic soil survey is to classify and map out different kinds of soil to understand soil differences and to organise the body of knowledge of soils in order to lay down standards of legends, nomenclature, terminology etc. On the other hand the applied part of soil survey will include soil conservation survey, irrigation survey and the like to enable the preparation of a land use plan. It also envisages the formulation of a national policy and procedure for all phases of the national soil survey and the cartographic activities, the development of national standards including soil survey operation soil survey interpretation, soil classification and correlation, soil survey investigation, and the standardization of methods and procedures for improvement of these activities.

The specific applied objective of the present scheme is to conduct immediately soil conservation survey for land use planning of the catchment area of 78,000 sq. mile of the six ^{river} valley projects viz. Kosi, Damodar, Chambal, Bhakra, Hirakud and Machkud. The target is to survey and prepare land use maps of an aggregate area of nearly 15,00,000 acres annually.

Besides it is contemplated to carry out a detailed soil survey of the major groups of soils in India with priorities in areas to be irrigated and in areas where soil conservation work is being carried out or is contemplated. The Central Soil Conservation Board has been financing this scheme with the Headquarters at the Indian Agricultural Research Institute, New Delhi, under the Director through a Chief Soil Survey Officer, with four Soil Correlation Centres, viz.

- | | | |
|---------------------------------------|---|--|
| 1) Alluvial Soil Region | - | Indian Agricultural Research Institute, New Delhi. |
| 2) Black Soil Region | - | Nagpur. |
| 3) Red and Laterite Soil Region - I. | - | Haringhata (at present at Calcutta). |
| 4) Red and Laterite Soil Region - II. | - | Bangalore. |

Besides there is a cartographic laboratory at Indian Agricultural Research Institute to procure and print field maps of soil survey.

The progress of work for the above soil correlation centres, during the year under report, is given in the following pages:

ALLUVIAL SOIL REGION DELHI

During the year under report this region has completed reconnaissance soil survey (1" = 1 mile) of two National Extension Blocks namely, (A) N.E.S. Block, Banga, Distt. Jullundur Punjab and (B) N.E.S. Block Sohawal Distt - Satna, Madhya Pradesh. The soil have been classified into associations and series and the soil maps have been prepared for the Nawanshahar and Banga N.E.S. Blocks comprising a total area of 1,32,000 acres. The soils covering a total area of 1,31,000 acres of Sohawal N.E.S. Block have been classified and mapped. The soils of these blocks have been indicated below:

A. Soils of N.E.S. Block Banga, District - Jullundur, Punjab,

The whole expanse of gently sloping plains is formed of comparatively recent alluvial deposits, several hundred feet deep, and laid down by rivers and streams draining Himalayan Range. The soils have acquired certain morphological features which essentially reflect the influence of environment. For example, differences in drainage and physiographic position have greatly affected the morphology and the salt concentration within the profile. The soils have been classified into the following units.

1. Naura series - Normal soils: These soils are found on the uplands or "Dhak" and are generally fairly well drained. This group of soils form about 60 percent of the total. These alluvial deposits have not undergone any drastic change by way of erosion losses or by addition of fresh sediments during the last few centuries. So these soils have acquired certain morphological features due to the interaction of climate. Because of good rainfall and free drainage the soils are free of excess accumulation of soluble salts or calcium carbonate within the root zone. However, a layer

of calcium carbonate accumulation in the form of Kankar nodules is invariably present at the depths, varying from 4' to 8'. The subsurface layer usually abounds in small iron and Manganese concretions.

2. Naura series - Saline phase: Main distinguishing features

of the soils are (a) presence of a compact and hard layer of Kankar nodules at a depth varying from 2½' to 4', and (b) high percentage of soluble salts in the profile. These soils occur in an imperceptible depression running continuously towards North West. During dry periods the salts are deposited on the surface in the form of crust or efflorescence. Imperfect drainage because of cemented Kankar layer, and a high percentage of salts interfere with the growth of most of the normal crops and permit only a limited group of grass which can tolerate these conditions.

3. Naura series - Saline-alkaline phase (recently water logged)

These were the normal, well drained cultivated soils akin to soil group No.1 only a few years back. These soils occur in the Northern part of the block and were the first to be affected because of generally rise in the water table brought about firstly by an increase in the average rainfall from 30" to 45-50" and secondly by the advent of canal system which is supplying big volumes of water to an already saturated area. If the ground water table continues to increase these soils will soon be converted into marshes and bogs. Soils where water is not on the surface but within the capillary rise range, have also been adversely affected and show efflorescence of salts on the surface during dry periods.

4. Bhaura series - These soils occur in a narrow strip

running on both sides of the white Bein. These soils remain under the stagnant water condition during and after rain. The soils are utterly stiff and tenacious swampy lands when wet, these soils are in puddled and poor physical condition unfit for any field operation. On drying, these soils become extremely hard and develop cracks.

5. Rahon series - This is a narrow, zig-zag strip of coarse

sand starting from the bed of river satlej and running North West

and then West for about 15 miles. The soils are a loose mass of coarse ~~sand which~~ sand which is of gray colour on the surface and changes to reddish brown with depth. The soils become very hard on drying because of cementation by iron oxides. The soils have very low nutrient level and their power of holding water is very little.

B. Soils of N.E.S. Block Sohawal, District, Satna, Madhya Pradesh:

The soils of this area range from deep, light gray brown and very dark gray brown clays to very shallow strong reddish brown upland gravelly sand with shales. They show a strong influence of geology and topography and have easily recognisable features. The morphological features of the profile show a close relation with the parent material. Hence the main soils of this area are classified according to the nature of the parent material. The soils are classified as associations and series as described below:-

1. Rowra Association - (a) Rowra series:- dark very/gray brown clay (without lime Kankar in the top layers but Kankar accumulation in the lower layer) - These soils are developed from the limestone and are dark gray in colour and clayey in texture. Clay content varies between 52.0 to 42.00 p.c. The pH of the soils varies from 7.8 to 8.0 and increases with depth of the profile. Total soluble salts are low (0.028). Usually there is an accumulation of organic matter in the surface layers which decreases with depth. The lime Kankars are invariably present through out the profile, Kankar accumulation is at the bottom layers. (CaCO_3 increases from 1.0 to 10.0 p.c.) with depth.

(b) Barha series - light brown gray, loam - These are shallow soils developed on the limestone but no carbonates are found in the profile depth. The top layer is light brown gray in colour but second layer is dark gray brown.

(c) Amdari - Kolgarhi series - Light brown gray, clay loam - These are fairly deep soils developed on limestone. The lime Kankars are absent in the top layers but accumulated in bottom depth. Brown mottlings are present in the surface or top layer.

2. Sohawal Association:- Two types of shales are met in this area i) Soft clayey shales with bluish colour and ii) Strong reddish brown and hard brittle shales, and the soils developed on them are of following two types:

a) Khamaria-Sithpura series - Gray brown loam (carbonate absent throughout the profile) - These soils developed on bluish shales are moderately shallow, about 24" deep gray brown on the surface, light olive brown in the middle layers and light brown gray to gray brown in lower most layers where the bluish shales are associated. There are clay loam to clayey soils and the clay content varies between 28.0 to 48.0 percent, within the profile which increases with depth of profile except the lower layer where there is a sharp decrease due to the presence of broken shales gravels. The pH increases with depth (6.1-7.9). Soluble salts are very low and the carbonate are absent,

b) Mahadewa series - Reddish brown gravelly sand (carbonate absent throughout the profile) - These soils developed on the red shales are shallow, about 12" to 18" deep sandy loam with a good proportion. The shales are of dark reddish brown colour and the soils bear a reddish brown. pH of the soils is 6.5. Total soluble salts are very low and the carbonates are absent.

3. Soils of mixed origin: Where calcareous rock is associated with shales the mixed type of soils are found.

(a) Gunhar series - Pale brown to light yellowish brown, clay loam - These are pale brown to light yellowish brown soils at the surface layer gradually gray brown in the middle layers and then to light olive brown in the last layer. The texture is clay loam (clay varies from 25th to 45 percent) pH of the soil varies from 6.5 to 8.1 and increases with the depth. Soluble salts are low (0.014) in the upper layers but are accumulated in the bottom layers below 5 feet (0.028). Lime Kankars are accumulated in the lower layer below 5 feet (49% CaCO_3) but are absent in upper layers.

(b) Pataora series - Pale brown sandy soils. Near the foothills this type of soil occurs. The lime kankars are absent in the upper layers but are accumulated in the lower most layer at the depth of 5-6',

(c) Survey of Catchment areas - Bhakra-Nangal River Valley

Project:- The soil survey staff appointed for soil conservation survey have been sent to the field after five week's preliminary training. Work has been taken up by stationing the parties at three centres namely; Swarghat, Bilaspur and Sundar Nagar. Preliminary reconnaissance of sub-catchment areas in these three places has been completed and materials for base maps have been assembled.

BLACK SOIL REGION - NAGPUR

The districts of Poona, Ahmed Nagar, Nasik and West Khandesh were traversed as a preliminary to actual survey. Soil samples were collected from representative areas and laboratory analysis was carried out for different constituents.

A detailed reconnaissance soil survey of Nasik district was started and continued during the year. Survey of seven Talukas namely: Malogaon, Baglan, Chandor, Nandgaon, Ycola, Niphad and Sinnar were completed. The total area of 23, 37, 317 acres have been surveyed.

Soils of Malogaon Taluk:- The area of 478,812 acres was traversed and in all 78 profiles were examined and soil samples were collected from these profiles. The following types of soils occur in this region.

(i) Shallow reddish brown sandy loam:- Colour varies from 5 YR 3/4 (dark reddish brown to - 5 YR 3/3 (dark reddish brown). These are mainly of single grain structure with entire absence of lime even upto the parent material. The depth varies from 3" to 9". This type of soil occupies the greatest part of taluka and the soils are almost barren. The large portion of this area is left uncultivated as the out-crops of the parent rock are observed on the surface. The area is unbunded and as such is subjected to severe erosion.

(ii) Shallow dark reddish brown to black clay loam - The colour variation of these soils is between 5 YR 3/2 (dark reddish brown) to 5 YR 2/1 black). They are mostly clayey, clay loam occupying the elevated planes near Malogaon. Absence of lime on the surface of these soils is very characteristic, however the murum layer

is mixed with some amount of lime in some areas - This type covers about 24 percent of the total cultivated area of the Taluka.

(iii) Medium dark reddish brown clay loam - The surface layer of this type of soil exhibits a colour variation between 5 YR 3/2 (dark reddish brown) and 5 YR 2/2 (black) when dry. These soils are clay loam in texture and of angular blocky structure. ~~Lime~~ increases with depth of profile and occur in the lower layers either as nodules or may be finally mixed with coarse gravel and soil. Where the soils are completely eroded lime concretions are seen on the surface.

(iv) Medium to deep dark gray clay - The colour variation is not much observed in this type of soil. The only variation is in depth and is dependent on topography. Lime is present in large amount on the surface and increased with depth. Soils being clayey the structure is mainly well formed angular blocky and though friable when moist, the soils are hard when dry. Deep cracks are often noticed on the surface.

Soils of Baglan Taluka:- The area of 398318 acres was traversed and in all 64 profiles were examined and sampled. The major area of the soils suffer from erosion (57-8%). The shallow soils cover more than 59 percent of the total area of the taluka out of which half is light in texture consisting mainly of gravel and half is gravelly clay loam. Only about 12% of the total area. Here also 1/3 of the type has gravelly clay loam to clay in texture. The proportion of deep clay soils is about 6 percent the total area. The areas under forest in the western and ~~xxxxxx~~ central part of the taluka are being brought under cultivation to distribute the lands to aborigins. These soils are rich clay loam to clay with medium depth.

Soils of Chandore Taluka - The area of 236761 acres was traversed and 56 profiles were examined. The major type of the soil in this taluka is of shallow nature. The texture varies from sandy loam to gravelly clay and at times clays also. This variation is mainly due to the topography and situation of the lands. Plain area

with proper bunds are protected from erosion with the result that the texture is at times heavy. The other main types of soils are medium clay loam to clay forming about 15 per cent of the total area and deep soils with clay loam to clay texture covering an equal area.

Soils of Mandgaon Taluka - This taluka covers a total of 269828 acres geographical area. The soil is mostly shallow covering nearly - 65 percent of the cultivated area. However contrary to the soils of the adjoining Malagaon taluka 75 percent of the total area under cultivation has medium texture. The same four types of soils as in Malagaon taluka are not within the taluka. The following is the percentage of the four groups of soils met with in the taluka.

1) Shallow clay loams	-	21 percent
2) Shallow clay loams	-	44 percent
3) Medium textured soils	-	30 percent
4) Heavy deep soils	-	5 percent

The soils are permeable with good drainage and the Kharif crops are grown.

Soils of Yeola Taluka:- The area of 262432 acres was traversed and in all 75 profiles were examined. As in Malagaon taluka there are mainly four ~~xx~~ types of soils namely (i) shallow clay loams (ii) shallow sandy loam (iii) Medium clay loam (iv) Deep clay loams tending to clay and in addition a patch of deep clay and in addition a patch of deep clay soils is found towards Niphad side. Type (i) Corresponds to type 2 of Malagaon taluka. Contrary to the soils in Malagaon taluka, however the variation of lime is a predominant factor in Yeola. This type of soil occupies about 30 percent of the total area of the taluka and is mainly concentrated in the North east portion adjoining to Mandgaon boundary and is south east round about Adsuregaon and Bharam.

Soils of Niphad Taluka - The area of 260015 acres was traversed and 42 profiles were examined. As the slope is gradual the soils are either clay loam or clay with varying depth. The main three types

of soils met with are i) Shallow clay loams ii) Medium clay loams and iii) Deep clay loams to clays.

In canal irrigated area water logged conditions have developed in deep soils with some patches of saline area. There is a difference in the colour of soils due to varying rainfall and erosion. In the north side the shallow soils are more reddish brown while on the southern side the soils are more reddish brown while on the southern sides the soils are dark gray to black in colour.

Soils of Sinnar taluka - This taluka covers an area of 321151 acres. In all 65 profiles were examined and samples collected. The main types are i) shallow sandy loams ii) shallow clay loams iii) Medium clay loams iv) deep clay loams.

The shallow sandy soils cover about 37 percent of the total area. The second type comes to 40 percent. This is a major type of soil met within this area. Medium clay loams are scattered over the area and comprise of 14 percent and 9 percent respectively of the total area.

(i) Shallow light soil - There is no difference in colour while a slight variation in depth and amount of lime is observed.

ii) Shallow clay loams - These are dark reddish brown in colour with subangular blocky structure. Lime concretions are observed which increases with the depth. Under this type, soils without lime are also met with.

iii) Medium clay loams:- These soils are similar to the above except for the depth. Lime is present in large quantities in this type and it forms about 14 percent of the total area.

iv) Deep clay loam:- These are dark reddish brown soils with surface lime in large quantities and are formed of medium angular blocky structure. They are hard in dry condition with abundant lime concretion increasing with depth.

SOILS OF HIRAKUD CATCHMENT AREA

Detailed soil survey of thirteen villages in Bhadan watershed amounting to total area of 15089 acres was completed. The revenue

map 16" - 1 mile was used and the profile was taken at every 100 acres.

In general, the village land may be divided into three groups depending upon the relative position of the area.

i) low lands:- These are situated at the lowest level in the village and are generally located round about village tanks. They are deep, 5 to 6 ft. sandy loam to clay loam to clay in nature, very sticky and hard when dry. Water table is generally high within 3 to 5 ft. during summer.

ii) Up lands:- These are situated generally on the upper side and the soils are generally coarse or fine sand to sand to sandy loam. The lower layers are mostly sandy although the depth of the sandy layer may be at times more than 5 ft.

iii) Forest areas and gullies:- The gullies are not banded and they do not also grow any forest trees or grasses. As a result they are severely gullied. The gullies are deep and wide. The soils are generally sandy and soil depths varies widely according to the slope on the lowest levels near nallas and seasonal streams the depth is generally higher.

LATERITE SOIL REGION No.1 - CALCUTTA

Reconnaissance soil survey of (I) 1,18,000 acres in Asansol subdivision, West Bengal (II) 63360 acres in Kharagpur Police Station in West Bengal, (III) 70,000 acres in Muruda Police Station in District Mayurbhanj, Orissa and detailed soil survey of about 24,960 acres in Kanksa Police Station, Asansol subdivision in West Bengal have been completed and the soil maps have been prepared. The soil survey in Machkund river valley project is in progress and the area of 7680 acres has been surveyed.

1. Soils of the laterite soil areas of Asansol Sub-Division in West Bengal:- Soils of the high lands are laterites or lateritic and are formed from the underlying parent material. The progress of laterisation is indicated by the formation of a pan of ferruginous concretions. In a high land, the depth of the soil is maximum at the top portion and is minimum at the edges, where the rock exposures are common.

Soils of the lowlands have mostly been developed out of the materials carried down wards by rain water from the surrounding high lands. The soils are quite deep and the pan of ^{ferruginous} / concrete does not occur within the depth of 5 feet, but may occur at a much lower depth, sometimes below 10 feet.

At places however, sub-soils are exposed due to erosion caused by flood water and that then ^{have} been converted into paddy lands. The soils by the sides of the rivers are alluvial and do not contain lateritic constituent below the surface.

The following soils have been identified and mapped on the basis of their profile characteristics. Their descriptions are given below:

Soils of lowlands. (1) Pale brown lateritic - Kuldiha series:-

This is found in Kanksa, Faridpur and Ondal Police Stations in the lowlands. The soils are very deep, and under cultivation growing mainly paddy. The top soil is sandy loam and has pale brown colour.

Soils of highlands - (1) Reddish Yellow lateritic -

Beldanga series:- This series is found in Kanksa and Faridpur Police Stations. The soils are deep, moderately well drained and have forest cover. The surface is generally covered with dry and partly decomposed litter of thickness about 0.2 inches. Kaolinisation is more prominent than laterisation. The texture of the top soil varies from loamy sand to sandy loam and the colour is reddish yellow.

(2) Reddish Yellow murrum laterite - Bistapur series:- This series occurs in Kanksa and Faridpur Police Station. The soils are moderately deep and moderately well drained. The surface layer is covered with dry and partly decomposed litter. The top soil has loamy sand to sandy loam texture. The murrum pan occurs below a depth of 42 inches.

(3) Reddish Yellow murrum laterite - Kamalpur series - This series occurs only in Faridpur Police Station. The soils are moderately deep to deep, well drained soils due to action of river, round shaped quartz gravels have been deposited in this area. The top soil is

reddish yellow in colour and loamy sand texture. The murum layer mixed with gravel generally occurs at a depth below 60".

(4) Reddish yellow murum laterite-Vijaynagar series:- This series is observed in Raniganj and Jamuria Police Station. The soils are moderately deep to shallow and moderately well drained. The top soil has loamy sand texture and murum pan generally occurs at 24 inches depth.

(5) Yellowish red reddish yellow rock laterite - Sankarpur series and Chinchuria series:- These two series occur in close association and it is very difficult to map them separately. The colour of the surface soil of Sankarpur series is yellowish red and that of Chinchuria series is reddish yellow. So that above names have been given. The area having a particular soil series in major portion has been marked on the map to have that soil series.

(5.4) Yellowish red and reddish yellow rock laterite-Sankarpur series- This series is found in Ondal and Raniganj Police Station. These are coarse textured shallow soils. These soils also carry thin vegetation.

(5 B.) Yellowish red reddish yellow rock-laterite-Chinchuria series:- This series is found in Faridpur, Ondal and Jamuria Police Stations. The soils is moderately deep to shallow. Occasional rock exposure is noted due to erosion. The soils generally carry thin vegetation.

II. Soils of the laterite soil areas of Kharagpur Police Station in West Bengal:- The soils of the highlands are laterite and lateritic and are formed from the parent material underneath. The progress of laterisation is indicated by the formation of pan of ferruginous concretion at a lower depth. At top the soil depth is medium and it is minimum at the ridges, where exposed rocks are common.

Soils of the lowlands have been developed from the materials carried by the rain water from the adjoining high lands. The soil is pretty deep. No ferruginous pan is found within 6 soil depth, but they may occur at 10'-15' depth.

The following soils have been identified:

The soils of the lowlands. I. Pale brown lateritic -

Kuldiha series:- This is a common soil of the low land under cultivation. This is similar to Kuldiha series that are found in Kanksa and Faridpur Police Station in Asansol Sub-division.

2. Light gray lateritic - Bisudha Series:- These soils are found in the very gently sloping cultivated uplands carrying terraced paddy cultivation. The top soil has sandy loam texture in most cases and has light gray colour.

Soils of highlands I. Reddish Yellow murrum laterite-Bistupur

Series:- This soil is moderately deep and moderately well-drained. This is similar to Bistupur series soils that are found in Kanksa and Faridpur Police Station.

2. Yellowish brown rock laterite-Khamaoli Series:- These are very shallow soils unsuitable for cultivation. The texture of the top soil is loamy sand. The murrum pan generally occurs at 11" depth.

3. Yellowish red-reddish yellow rock laterite-Sankarpur Series:- These are coarse textured shallow soils and carry thin vegetation. These soils are similar to Sankarpur series that are found in Ondal and Raniganj Police Station in Asansol^S Subdivision.

III. Soils of the laterite soil areas of Muruda Police Station in the District of Mayur Bhanj in Orissa:-

The highland soils are laterites and lateritic which are characterised by the formation of a ferruginous pan underneath. The depth of the soil over the murrum or laterite rock, varies from place to place due to erosion activities, but generally at the edges of a high land, the soils are very shallow.

Soils of the lowland are formed from the deposited materials, carried by rain water from the high lands and are quite deep. Number of Ferruginous concretions increases with depth, but no iron pan is found even upto a depth of 15'. In the low land, alluvial soil also occurs in some places.

Soils of the lowland (1) Light gray murren laterite - Raisol Series:- These are deep soils, poorly drained, formed on the deposits carried out by rain water from the adjoining high lands.

Soils of the highlands - (1) Yellowish red rock laterite Bhadasol series:- These soils are shallow to moderately deep. The area is open as well as covered with forest frequent exposures of laterite rock is also found. The physiography is gentle undulating and rolling. Medium to high sheet erosion is observed in the area.

(2) Yellowish red murren laterite - Banabata series:- These are shallow soils formed in moderately sloping lands. High sheet erosion is prevalent in the area. The surface is covered with stony grasses with occasional exposure of rocks laterite.

(3) Strong brown murren laterite - Bhansol Series:- These are shallow soils formed in moderately sloping areas. High sheet erosion is prevalent. Forest cover with occasional exposure of laterite rocks are found.

(4) Strong brown murren laterite - Khuntia series:- These are also moderately deep to deep and moderately well drained soils. The surface is covered with sal forest. Medium sheet and gully erosion is prevalent.

(5) Yellowish brown murren laterite - Itchasi series:- These are moderately deep to deep soils and are moderately well drained. The physiography is gently sloping. Medium sheet erosion is prevalent. The area is covered with dense sal forest.

(6) Yellowish brown murren laterite - Damodarpur Series:- These are deep soils formed in uplands covered with forest, but are poorly drained.

(7) Reddish yellow murren laterite - Kakband series:- These are well drained very deep soils formed in uplands covered with forest.

(8) Reddish Yellow murren laterite - Khanpur series:- These are moderately drained deep soils formed in uplands covered with forest.

IV. Soils of Kanksa Police Station:- The following soils have been indentified and mapp d in the area so far. Their descriptions are given below:

Light gray lateritic - Birudha series:- These soils are found in the very gently sloping cultivated uplands. Paddy is cultivated in the terraced fields. The area is moderately drained. These are similar to the Birudha series soils of Kharagpur Police Station.

Pale brown alluvial-Kanksa series:- These soils are found in the lowlying alluvial fans. These are poorly drained soils and carry paddy cultivation.

V. Soils of catchment area - Machkund river valley project:- The soil conservation survey was started in the catchment area of the Kinchor Nadi, one of the tributaries of the Machkund river. This area is in a state of progressive erosion and the hills are mostly bare. In the area surveyed so far, three catagories of soils have been noted. The description of these soils are given below:

1. Soils of the hill slopes - (I) Reddish brown lithosolic Soil - Kalapada Series:- These soils are found in the dome shaped top of the hills and on the side of the hills, which are subject to high sheet erosion. The surface is gravelly and stony and has very little vegetation cover. These soils are unsuitable for cultivation and need afforestation.

2. Soils of sloping uplands - (I) Yellowish red colluvial soil pinulput series:- This area begins from the foot of a hill and extents up to the edge of the sloping uplands, dissected by the gullies and converted to paddy fields. The slope ranges from 3 to 8 percent or more. The formation of these soils is due to process of colluviation by which deposition of eroded soil materials from the top hills, caused by run off, has taken place under the force of gravity. The surface of the land near the foot hills has stony phase. The depth of soil is shallow here and the lands may be cultivated with difficulty by practicing proper soil conservation measures. At a distance from

the edge of the hill, the soil is deep and friable and may rest on laterite rock. With appropriate soil conservation measures and good management, these soils are expected to produce good yield.

3. Soils of the lowlands: (I) Dark reddish brown lowland soils - Kona series:- These soils are in the water channels and gullies which were reclaimed by bunding and terracing for paddy cultivation. These areas lie between sloping uplands and are always in wet condition due to continuous seepage of water and are suitable for paddy cultivation.

RED AND LATERITE SOIL REGION II (BANGALORE)

I. Survey of soils in Coorg:- The work during the year was mainly directed towards the analysis of the various soil samples collected during the field survey, and also in preparing a tentative soil map of Coorg on the basis of differentiation into various soil series and associations. The area of about 1,00,000 acres has been surveyed and mapped.

Major series:- 1) Athur series 2) Chethalli series 3) Sidhapur series, 4) Ammathi series, 5) Bittangala series, 6) Napoklu series. The soils which may be grouped as association would appear to fall under the following categories.

1) Athur - Ammathi - Sidhapur Association and 2) Sidhapur - Chethalli associations.

Minor series:- 1) Arji. 2) Hoskottay 3) Mavkut. 4) Lakkunda.

II. Survey of soils in Andhra Pradesh:- The detailed traverse survey of the Mayalpad taluk in Chittoor district and the adjoining Rayachoti taluk in Cuddappah district were completed during the year. The total area of 4,25,000 acres has been surveyed and mapped on 1" = 1 mile maps. The soils in the area in general are shallow and sandy in texture. In localised places occurrence of considerable deposits of saline and calcareous materials have been noted and these have been demarcated in the maps. The occurrence of considerable quantities of lime stones in the form of dendritic formation to be due to the deposition of calcium carbonate dissolved out of the decomposition products of the basic rocks in the

neighbouring hills and precipitation from the percolating waters in the sub-soil layers.

From the various profile pits and other natural cuttings studied, the soils in the vayalpad taluk have been classified under four series for the non calcareous type, which for convenience are designated as series I to IV and two calcareous types which are designated as series V and VI.

Soil series of vayalpad - Non calcareous types series I -

These are very shallow brown or reddish brown sandy loam, low in organic matter, structure less soils. The parent material "murram" is below 20".

Series II - These are brown to brownish red sandy loam, gritty, low in organic matter with reddish and yellowish murram full of quartzite gravel as parent material at 3 feet depth.

Series III - These are reddish brown sandy soil developed on the disintegrated coarse granite with quartzite gravel.

Series IV - Red sandy soil with clay developed on granite.

Calcareous types-Series V - Brown sandy, ^{kes} structured soils developed on limestone with saline deposition.

Series VI - Brown sandy well drained soils with the lime Konkars at the bottom layer at the depth of 3 feet.

Soils of Raychoti Taluk - During this survey 33 profile pits were excavated and the profile features in these and numerous other natural cuts were examined. It is found that the soils of this taluk can be classified under series which have already been described for vayalpad, excepting that soils belonging to vayalpad series VI do not seem to occur.

The soil map of this taluk is under preparation.

III. Survey of soils in Mysore State:- The total area of 1,25,000 acres in this taluk have been surveyed and mapped.

Honnali Taluk:- The area is mainly covered over by shallow red soils of a coarse texture, which are distinguished by the presence of a continuous stone-line formed of quartz gravel, at the interface between the B and C horizons. This stoneline exists at a depth

varying from a few inches from the surface to about 18" or 20" from the surface and appears to represent the remnants of a previous erosion era. In most of the areas, the granitic parent rock of the soils appears as a thin layer with the more basic schist and dolomite intrusions, where they have not cut through the surface, appearing at only a short depth from the surface.

The red soils have been described under three series named (1) the Honnali series (2) the Kundur series and (3) the Chikkagonigere series, of which the first two are non-calcareous and the third one calcareous. The calcareous soils are found in localised places at the foot of the schist ranges, and are very likely formed by the movement of lime and other bases dissolved from the nearly basic rocks, and their deposition in the sub-surface layers. The black soils which appear to be of variable depth are not differentiated and are described under one series only.

Shikaripur-Taluk:- The soils of this taluk are found to fall under only two series, of which the first named the Shikarpur series occurs extensively over the taluk, while the second the Malur series in a limited area.

A characteristic of the Shikarpur series soils is occurrence of a deep layer in the B horizon, which ranges in thickness from a few inches to nearly two feet and over, of rounded iron concretions. The occurrence of beds of these pisolitic iron concretions overlying soft, decomposed but undistributed schistose material lead to infer that these are not related or developed from the underlying material and are transported and deposited.

Sorab taluk:- A rapid reconnaissance soil survey was conducted in this taluk and about 30 profile pits were examined. The soils have been classified in three series namely 1) chagatur series 2) Tekken series and 3) Hale Sorab series.

Survey of soils in Kerala:- A rapid reconnaissance of South and Central Kerala was carried out by the Soil Correlator in company with the Agricultural Chemist of Kerala, with a view to fix the localities where soil survey could be begun on a priority basis.

CARTOGRAPHIC LABORATORY

G E N E R A L

The building of the Cartographic Laboratory is being fitted up with 60 Kw three phase power supply and it is expected that soon the photo-litho Camera and the colour press will be fitted up and processing and printing of soil maps prepared by the field parties of All India Soil and Land Use Survey Scheme will be taken up.

Installation of the equipment:- The proof press and the contact printer have been assembled and have been brought into working order.

Administration of the Cartographic Service:- An outline of procedure has been laid down for the Cartographic service from the pre-field stage to the final reproduction stage. According to this, jobs have been distributed to the Cartographic Laboratory and regional Cartographic Section according to the equipment facilities and requirements of the work as also the qualifications of the staff.

PREPARATION OF BASIC SOIL REGION MAPS

It has been widely felt that topography plays an important part in the soil formation. A widely accepted method of depicting topography for soil formation in terms of slopes percentages is applied to India. The slope categories are 1.2 percent, 2.4 percent; 3.6 percent, 4.8 percent; 6.0 percent and 7.2 percent. The area taken for detailed examination of slope analysis were Madras and Mysore States.

Training:- Twentyseven Soil Survey Assistants were given five week's intensive training in soil survey at Dehra Dun and then sent to their respective working centres.

A tentative manual for detailed standard soil survey was drawn up for immediate use of the field workers of the staff. This manual has also been circulated to the State Governments for comments and suggestions for revising it.

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PROGRAMME OF WORK OF ALL INDIA SOIL AND LAND USE SURVEY SCHEME
FOR 1958-59.

1) Alluvial Soil Region, Delhi:

- A) Detailed Soil Survey (16" = 1 mile) of 7.2 Lakh acres and reconnaissance soil survey (1"=1 mile) of 14.5 lakh acres will be carried out as below:
- i) Survey of Bhakra Nangal Catchment

Detailed Soil Survey of	2,50,000 acres.
Reconnaissance soil survey of	7,50,000 acres.
 - ii) Survey of Chambal Catchment:

Detailed soil survey of	1,50,000 acres.
Reconnaissance soil survey of	4,50,000 acres.
 - iii) Soil survey of Bhakra Nangal (Command area) Jullundur and Hoshiarpur. Distt.

Detailed soil survey of	2,00,000 acres.
Reconnaissance soil survey of	50,000 acres.
 - iv) Soil survey of irrigations of Rajasthan.

Detailed soil survey of	1,20,000 acres.
Reconnaissance soil survey of	2,20,000 acres.
- B. Correlation of Soil Survey work of the Alluvial Soil Region and issue of reports.

2) Black Soil Region - Nagpur:

Detailed soil survey (16" - 1 mile) will be carried out as given below:

- I. Survey of Sapai river watershed in Sundargarh dist. (Orissa) under Hirakud catchment.

	1,00,000 acres.
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- II. Survey of Bhadan Tholia and Hathia watersheds, Hirakud catchment area.

	1,35,000 acres.
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- III. Survey of Afforestation and anti-erosion works in dry eroded land in Maratha Wada area (Bombay State)

	75,000 acres.
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- IV. i) Survey of Kurnur Distt. (Mysore State)

	75,000 acres.
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 - ii) Survey of area in the scheme "Contour bunding" (Hyderabad-Karnatak and Bombay-Karnatak).

	75,000 acres.
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 - iii) Survey of area in the scheme "Introduction of dry farming in bunded areas".

	75,000 acres.
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- V. Survey of area in the scheme "Bhopal land development".

	75,000 acres.
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VI. i) Survey of area in the scheme soil conservation expansion of area under cultivation and mass bunding schemes(M.P.)

ii) Survey of area in the scheme "Construction of field embankments"(M.P.) 75,000 acres.

3. Red and Laterite Soil Region-I(Calcutta):-

I. Detailed soil survey (16" - 1 mile) of catchment area of Machkund river(Orissa) 1,44,000 acres.

II. Detailed Soil Survey(16" = 1 mile) the catchment area of Machkund river(Andhra Pradesh) 1,44,000 acres.

III. Detailed Soil survey(16"-1 mile) of the catchment area of Koshi river(Nepal) 57,600 acres.

IV. Detailed soil survey(16" - 1 mile) of irrigated areas of the Dist. of Burdwan in West Bengal commanded by D.V.C. Project. 66,800 acres.

V. Detailed soil survey(16" - 1 mile) of Irrigated area of the district of Puri in West Bengal commanded by Naraj Delta Project. 28,800 acres.

VI. Detailed soil survey (16" - 1 mile) of irrigated area of the district of Cuttack in Orissa commanded by Naraj Delta Project. 28,800 acres.

4. Red and Laterite Soil Region-II(Bangalore).

I) Reconnaissance soil survey (1" - 1 mile) of Honnali, Shikarpur and Sorab taluks(Mysore) 1,00,000 acres.

II. Reconnaissance soil survey(1" - 1 mile) Sagar and Rosanagar taluks(Mysore) 1,00,000 acres.

III. Reconnaissance soil survey(1" - 1 mile) Rayachoti, Chandrajiri, Razampet and Nalagoda taluks(Andhra Pradesh) 1,00,000 acres.

IV. Reconnaissance soil survey(1" - 1 mile) of Shertalai, Tiruvalla, Ambalpuzha, Kottayam taluks(Kerala). 1,00,000 acres.

V. Reconnaissance soil survey(1"-1 mile) of Coorg, Pondichery, Palni, Periakulam Tirmangalam taluks(Madras). 1,00,000 acres.

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SOIL CONSERVATION IN ORISSA.

THE PROBLEM :

Orissa consists of hill tracts, central table land and coastal belt of alluvial soils. Due to misuse of the land and faulty methods of cultivation soil erosion takes place at an accelerated rate in hills valleys and the coastal areas. The problem of erosion control is of supreme importance in the State and there is urgent need for conservation measures.

The total area of the State is 3,84,000,000 acres (60,000 sq. miles) of the above 88,00,000 acres (13,750 sq. miles) constitute forest lands including barren hills and devastated forests. Total area under agricultural crops including fallow is 16,860,000 acres (26,250 sq. miles) The idle land i.e. waste lands which could be used for growing of trees, grasses or annual crop is 65,70,000 acres (10,156 sq. miles) The remaining 63,00,000 acres or 9,844 sq. miles are urban land or unculturable waste land.

Table - I.

Land use in Orissa.

Land use.	Area in acres.	Sq. miles.	Percent.
Forest land (including barren hills & devastated lands)	8800000	13,750	22.91
Crop land including fallow.	16800000	26,250	43.76
Idle land.	6500000	10,156	16.93
Urban or unculturable waste land.	6300000	9,844	16.40
	38,400,000	60,000	100

From the table I it would be seen that about 23% of the total area is classified as forests. Reserve Forests both demarcated and undermarked protected forests village forests and unclassified forests are included in the above class. However a good portion of the above forest land particularly the village and unclassified forest lands are forest by name but they have no vegetation and are mostly barren. Even in case of reserve forests of the Ex-State areas (areas that had been under the management of feudatory chiefs) and samadari forests there are vast stretches of eroded land. In view of the above the existing forests fail to give necessary protection against soil erosion. The Chief causes of soil erosion in the forest land is practise of shifting cultivation, over grazing and forest fires. Shifting cultivation is very widely practised in the hilly

THE PROBLEM :

Orissa consists of hill tracts, central table land and coastal belt of alluvial soils. Due to misuse of the land and faulty methods of cultivation soil erosion takes place at an accelerated rate in hills valleys and the coastal areas. The problem of erosion control is of enormous importance in the State and there is urgent need for conservation measures.

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areas of the State. The forests are cut and burned by the tribal people to grow crops on hill slopes. After growing crops for 2 - 3 years the fertility of the soil goes down and tribal men move to a new area to repeat the above type of importment land husbandry. It is estimated that more than 12,000 sq. miles or one fifth of the total land surface of the State suffer from acute soil erosion due to shifting cultivation and about a million of the tribal people depend on this type of farming. For conservtion of soil and welfare of the tribal people in the State the control or rationalization of shifting cultivation is most important and needs immedate attention.

Detailed survey of the barren areas inside various types of forests have not been undertaken. However about a quarter of the area classified under forests would need conservation measures like patch plantation, control of gullies, re-generation and protection. Thus an area of about 2.2 million acres have to be tackled in the forest area.

The total crop land including current fallid in this state is estimated at 1,68,00000 acres. The average yield per acre in Orissa is one of the lowest in the country. The average yield of rice per acre in Orissa is around 500 lbs. against the all India average yield of 818 lab. per acre. The chief cause of the low yield is the poor fertility status of the soils and conservation measures are essential to increase the yield in case of crop land of the State. In hilly areas of the state the undulated lands are cultivated without any conservation measures like contour bunds, terraces, contour farming or ctrip cropping. This results in accelerated soil and water loss and the yield of crops is very low. In case of terraced lands primitive methods of farming are followed. Mixed crops, crop rotation, or application of manures are rarely done. This results in serious fertility erosion and special conservation measures are necessary to build the soil fertility and to give sustained yield. Survey of the selected catchments in Sundargarh and Dhenkanal districts indicate that about 50% of the total lands under cultivation needs intensive conservation measures. The measures that would be necessary are countour bunds, terraces, diversion channels, grass water ways and other water disposal system in addition to introduction of improved cropping patterns. Thus it is estimated that about 8.4 million acres of crop lands are in need to one or more of the anti-erosion measures referred to above. In the State there are 6.5 million acres of idle land which are foci of soil erosion. As soil erosion

from the waste lands affect the agricultural lands down below soil defence measures are essential in the above up lands. The idle lands in each village could be utilised for growing of fuel, fodder and annual crops. The eroded lands could be profitably used to develop village pastures. From the survey data collected in the Hirakud Dam catchment area it appears that 75% of the idle lands would need special conservation measures like planting of trees, and grass, contour ploughing, pitting, contour trenching and protection against uncontrolled grazing, in the State the problem of stream bank erosion is very acute. Each year good crop lands and villages situated on the bank of the streams are eaten away and protection of the above properties is very important. Control of stream bank erosion could be achieved to a great extent by planting of suitable species in the eroded banks. It is estimated that around 4.9 million acres of waste land including stream banks and sands adjoining the sea coasts would need conservation measures. Important river valley projects costing several crores have been undertaken in the State i.e. Hirakud and Machkund Dams. Execution of comprehensive soil conservation programme in the Dam catchments (in forests, agriculture and waste lands) are both urgent and essential to prolong the life of the Dams. Up lift of the tribal people and sustained crop production at a high level depend on the control of soil erosion and execution of ~~xxx~~ comprehensive soil defence programme.

SOIL CONSERVATION ATTEMPTED IN ORISSA.

The soil conservation programme was initiated in the State in the year 1954. Four Demonstration centres were opened in the problem areas of Sundargarh, Sambalpur, Dhenkanal and Koraput districts. In these centres a comprehensive land use programme is demonstrated and different anti-erosion techniques are studied to find out suitable ones for the locality. A school was established at Rajgangpur to train junior field staff in survey and execution of anti-erosion methods. A survey party was organised to survey the problem areas and to formulate the working plans for execution of soil conservation measures on water-shed basis. A soil Conservation Laboratory has been set-up near the Agricultural College, Bhubaneswar to undertake laboratory studies of soil conservation problems. The soil defence programme has been extended to the river valley catchment areas of the Hirakud and Machkund Dams where soil erosion is very acute. Also a pilot programme to control shifting cultivation has been started near

Koraput in Koraput district. The soil conservation measures are being extended to the National Extension Service Blocks located in tribal areas and to other blocks - where soil erosion is very active.

The technique developed to control soil erosion in the state consists of -

(i) Demarcation of slope above 1 in 10 or 10% . The slopes above 10% are kept reserved for natural re-generation or tree planting. The 10% slope line is demarcated by planting 3 - 4 rows of cashewnut trees in staggered contour trenches. Diversion ditches are provided below the 1:10 slop line for safe disposal of excess run off from the hills.

(ii) Below 1 in 10 slope the land suitable for cultivation are contour hunded or terraced. Improved cropping systems like introduction of legumes, manuring, contour cultivation strip and mixed cropping are introduced in the contour bunded land. Extension work is being carried out to induce the people to take up growing of fodder grass in contour bunds or terraces.

(iii) Where the pressure on land is high the people are allowed to cultivate slopes upto 20° of 35% . Stone wall terraces are provided in lands between 10% and 20° to check soil loss. No cultivation is allowed above 20° line.

(iv) The gullies and the nala banks are stabilized by planting of grasses and useful trees. Grass water ways and diversion channels are provided in the watersheds to take care of excess run off. In the less undualting areas of the catchments soil conservation measures are executed in the waste or idle lands in addition to the crop lands. The waste ~~waste~~ lands ~~in~~ are developed into village plantations or pastures. The conservation methods applied consists of protection against grazing contour ~~trenching~~ trenching and planting of useful trees, species like Teak, Ghambar, Sisu, Eucalyptus and others. In the pasture development scheme the lands are contour ploughed and planted with grass and rotational cutting and grazing are enforced.

The soil conservation measures to stabilize the coastal sand dunes x are in progress. The procedure consists of planting of casurina, cashewnut etc. in the sands. These plantations help to stabilize the movement of sands and protect agricultural lands adjoining the sea coast against ill affects of wind erosion and add to the production of fuel wood, minor timber and food.

PROGRESS MADE IN SOIL CONSERVATION.

The pilot soil conservation works attempted in the state are located in five selected watersheds. Comprehensive land use plans of the selected watersheds. Comprehensive land use plans of the selected watershed have been prepared based on capability of the land and different anti erosion measures are being executed according to the plan. The crop lands excluding terraced fields are provided with contour bunds or stone terraces. Diversion channels and grass water ways are provided at suitable interval to take care of excess runoff. The average cost of contour bunding including provision of grass & water ways is Rs. 40/- per acre. Contour bunding has been the most important item of soil conservation work. After the lands are contour banded improved cropping practices are introduced. Demonstration plots to show increase in yield due to green manuring, good seeds, mixed cropping, crop rotation and manuring are set up in farmers contour banded lands. These experiments have induced the farmers to adopt improved system of farming in their contour banded lands. In the different soil conservation centres 22,400 acres have been contour banded or terraced and 60 demonstration plots have been set up to demonstrate the use-fulness of conservation farming.

In the selected watersheds 12694 acres of badly eroded lands have been planted with useful trees like cashewnut Agave, Bamboo, Sisoo (Daalbergia Sisso) etc. The average cost of tree planting varies from Rs. 60/- to Rs. 120/- depending on the type of species planted, fencing used and labour rate etc. Also 3080 acres badly eroded lands have been developed into village pastures. The cost of pasture development is Rs. 108/- per acre and the amount includes the cost of fencing. Gully control measures like planting of grass and trees, giving gentle slope to the gully banks and providing check dams diversion ditches at the gully heads have been undertaken over 1284 acres of gullied lands in the selected catchments. In the coastal areas casuarina have been planted over 7,000 acres to protect the agricultural lands from the movement of sand.

In addition to the above 67 Junior assistants have been trained at the Soil Conservation Training School and 2,20,000 acres of eroded lands have been surveyed for preparation of land capability maps ~~map~~ by the S Survey party. In the Demonstration Centres different fruits and grasses are being grown to find out suitable ones for the locality. The useful trees and grasses are multiplied and are made available to the people of the locality. In the demonstration centres about 50 acres are under fruit

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trees and grass nurseries constitute 10 acres.

ADDITIONAL PRODUCTION DUE TO CONSERVATION MEASURES :

The problem of soil erosion is most acute in the hilly areas of the State and anti-erosion works done so far are located in the above said area. Due to the practice of shifting cultivation and primitive methods of farming the yield of food crops in the hilly areas has always been extremely poor. In case of Ragi (Eleusine Coracana) or up land rice the average yield is below 450 lbs. per acre. During the year 1957-58 a detailed survey was undertaken to assess the additional yield due to contour bunding or terracing. The survey data collected from Sundargarh, Dhenkanal and Koraput districts indicates that contour bunding alone increased the crop yield by about 30% over the non-contour bunded plots. In Orissa 22,400 acres have so far been contour bunded. Taking an average of yield of 135 lbs. per year per acre due to contour bunding the total additional yield due contour bunding is estimated at 1350 tons per year. Contour bunding is not a complete soil conservation measure. The lands contour bunded should be put to best farming techniques like proper crop rotation introduction of legumes, application of manures and fertilisers, strip cropping etc. Countour bunds or terraces with improved crop rotations could easily increase the present yield to 50% and with the increase in soil fertility the yield may easily be doubled within a period of 3-4 years. The lands so far contour ~~bund~~ bunded are mostly uplands. They are formerly cultivated ones in 2 or 3 years as the farmers considered it un-economical to farm each year due to rapid loss of soil fertility. After the construction of bunds the farmers have started to cultivate the lands each year. This results in substantial amount of additional crop production. As part of soil conservation measures 7000 acres of land in the coastal districts have been planted with casurina. The available data indicates that casurina yields about 1600 labs. of excellent fuel wood per acre with a rotational period of 20 years. The investment of raising one acre of casurina plantation is Rs. 120/- and the income at present derived from a mature plantation at the end of 20 year period is Rs. 800/-. Thus it would indicate the usefulness of casurina plantations as a commercial crop and an agent of soil conservation.

CROP PATTERNS AND NEED FOR RESEARCH.

In the hilly areas very primitive methods of farming are still practiced by the tribal people. Use of improved seeds, application of

manures and fertilisers systematic crop rotation and legume culture are not known. To obtain maximum yield from the land on a sustained basis it is very necessary that proper crop husbandry is introduced in the contour bunded plots. With this aim in view pilot plots have been started in the soil conservation centres located in the Machkund and Hirakud Dam Catchments. The lines of work are as follows:-

- (i) Growing of legumes and non-legumes on alternate lines. Ragi (*Eleusine coracana*) and jowar (*Andropogon Sorghum*) are being alternately grown with legumes like Dungarrani (Cowpea) horse gram and Arhar.
- (ii) Different green manuring crops are introduced in the rotation.
- (iii) Improved seeds of Ragi, (*Eleusine Coracana*) upland rice are being introduced along with more cash crops like Potato, Groundnut etc. which are new to the area.
- (iv) Contour cultivation is being demonstrated along with the strip cropping (rice, groundnut, maize).
- (v) In case of idle land different fruit and timber species like Cashewnut eucalyptus, wattle, sisu, Agave, grasses are being grown to find out suitable ones for the different locality.
- (vi) A large number of fruit trees i.e. Mango, Gouva, Orange etc. are being tried for reclamation of eroded lands.
- (vii) For reclamation of gullies and stream bank erosion control work a number of grass and tree species are being studied and their usefulness being evaluated. It would be seen from the above that experiments only on a very selected problems have been initiated and studies on different aspects of erosion control work remain to be done.

Experiments on cropping patterns for contour bunded lands on a very limited scale have been initiated in two districts namely Koraput and Sundargarh. Crop patterns for other areas of the State having different soil and climatic conditions remains to be worked out. Studies to find out strip cropping scheme that would help to conserve the soil in lands having 2 - 3% slope without contour bunding have to be undertaken. For growing of winter crops it is very essential to conserve the moisture. Studies to find out the different mulching systems to conserve soil are necessary. For the irrigated areas experiments to find out best method of irrigation and water utilisation are essential. In the coastal areas there are vast stretches of saline soils. Investigations to determine conservation

measures for their reclamation are necessary.

In the present set up no special provision has been made to undertake research relating to soil and water conservation problem. In view of the magnitude of the erosion control work in the state it is necessary to place greater emphasis on research to find out more suitable methods of conservation at a less cost. It is proposed to establish 5 Regional stations in the problem areas of the State where experiments on lines indicated above could be undertaken on a systematic manner. These centres could be located on soil basis i.e. one each for Red soil, Alluvial soil, Datasol soil, Saline soil and Regour (block cotton) soil areas.

TASK AHEAD.

From the analysis presented earlier it would be seen that 2.2 million acres of land in the forest and 8.4 million acres of crop land would need intensive conservation measures. In addition to the above 4.9 million acres of idle land, stream banks and coastal and dunes have to be planted with suitable species or developed into pastures.

Present land use.	Area requiring S.C. measures in million acres.	Cost of conservation measures per acre.	Cost to cover area under S.C. measures million rupees.	Remarks.
Forest land.	2.2	Rs. 60/-	132.0	
Crop land.	8.4	Rs. 40/-	336.0	
Idle land (including stream bank and coastal sand dunes.)	4.9	Rs.120/-	588.00	
Total.	15.5	--	1,056.00	

Thus out of the 38.4 million acres of the total land surface of the State about 15.5 million acres would need intensive conservation measures. Cost of patch plantation, regeneration and control of gullies in the forests cost on a average about Rs. 60/- per acre, the total eroded lands in the forests is estimated 2.2 million acres. Therefore a sum of Rs.132.0 million would be necessary to tackle erosion problem in forest land. For agricultural land the rate of contour bunds, grass water ways, diversion channels and water disposal systems is estimated at Rs. 40/- per acre. The total cost to tackle 8.4 million acres of crop land in need of conservation measures is Rs. 336 million. 4.9 million acres of idle lands have to be planted with trees or grass. The estimated cost of afforestation would come

to Rs. 120/- per acre. Thus a sum of Rs. 588/- million would be necessary to tackle 4.9 million acres of idle lands.

From the above Table II it would be seen that Rs. 1056 million would be necessary to undertake different type of soil conservation measures on the 15.5 million acres of eroded lands. The average cost of conservation measures is Rs. 68 per acre. This however does not include cost of the research organisation, supervisory staff and contingencies. In view of the importance of the research for soil conservation field planning a sum of Rs. 144 million may be set apart for research. Thus the cost of works and research is Rs. 1200 millions. The staff may be estimated at 25% of the above and a sum of Rs. 300 million may be set apart for supervisory staff. Another Rs. 300 millions may be necessary to meet the cost of contingencies, stores and housing facilities. The total of the estimated cost of Rs. 1800 millions (Table III) The above amount is likely to vary depending labour rate and change in soil conservation techniques.

Table. III.

<u>Total cost of Conservation measures.</u> Item.	<u>Cost in million rupees.</u>
1. Cost of conservation measures over 15.5 million acres of eroded land.	1,056
2. Cost of Research and Pilot Programme.	144
3. Cost of Supervisory staff and @ 25% of item 1 and 2.	300
4. Contingencies, stores and housing facilities.	300
	1,800

The execution of the above programme would increase of crop production over an area of 8.4 million acres. According to very conservative estimate the additional yield due to contour bunding and other conservation measures has been kept at 600 lbs. per acre, the present yield being 400 - 500 lbs. per acre. Thus there would be additional production of 2.3 million tons of food grains, for the area contour banded. The investments made above would increase the substantial amounts of fuel, timber and fodder production. It would also help to protect the life of the dam like Machkund Hirakud and proposed Bhimkund and others. It would reduce the floods and protect the valuable lands adjoining the banks. The programme would offer employment and improve the economic condition of the people depending on land husbandry.

It would be difficult to find out Rs. 1,800 millions or 150 crores for soil conservation works in the State. Also large number of technical persons required to execute the above programme in a short period may not be readily available. It would not be desirable to prolong the period of operation of the programme as Dams under the River Valley Schemes are being silted up rapidly and conservation measures are urgently required in catchment area. The land under shifting cultivation are deteriorating very rapidly due to soil erosion and without execution of proper land use programme at-once, it would be difficult and in many cases impossible to protect them from being made unfit for forest, agriculture and pasture development. Therefore it is proposed to spread the work over coming 3rd, 4th, 5th and 6th Five Year Plan periods - 20 years.

Directors have approved the suggestions. The next meeting in this connection is proposed to be held at 3.30 p.m. on Monday 10th November, 1958 in J.S. (SAP)'s room.

The revised draft note is enclosed.

(J.S. Sapru)
Senior Director of Soil Conservation

All Members of the Executive Group for Soil Conservation,
Min. of P. & H. Govt. of A. P. 300 Sec. 4-52-1011 Gms. (11)
Dated 10th Nov. 1958.

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MINISTRY OF FOOD AND AGRICULTURE
(Department of Agriculture)

Subject:- Formulation of the Third Five Year Plan -
Soil Conservation.

Reference: E. & S. Dte. U.O. No. F.7-1/58-PC-ES dated 8.8.58.

A meeting of Working Group for Soil Conservation was held on Saturday the 4th October, 1958 in J.S.(S&F)'s room to consider the revised note prepared by Directors of Soil Conservation on the Third Five Year Plan on Soil Conservation. During the discussion a few suggestions particularly with reference to co-ordination of Soil Conservation programme with other agricultural developmental plans were made. The Working Group desired that a revised note on the lines may be prepared for discussion by the Working Group.

A revised note has now been prepared by the Directors incorporating the suggestions. The next meeting in this connection is proposed to be held at 3.30 p.m. on Friday the 14th November, 1958 in J.S.(S&F)'s room.

The revised draft note is enclosed.

W. Basu
7.11.58
(J.K. Basu)
Senior Director of Soil Cons.
Convenor

All Members of the Working Group for Soil Conservation.
Min. of F. & A. (D.of A.) U/O No. 4-4/58-Soil Cons.(Pl)
Dated the 7th Nov. 1958.

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CHAPTER I

PROBLEMS OF SOIL CONSERVATION

1.1 India is mainly an agricultural country. Nearly 70 percent of her population lives on agriculture as the main stay. More than 50 percent of her national income comes from agriculture. However the yields of crops are probably the lowest in the world. At the present level of production, country is in deficit supply of food, fodder, fuel and raw materials for the industry, most of which, come from the land. With the ever increasing population and developing economy, the demand on agriculture has increased considerably. This calls for a concerted effort to increase agricultural out put manifold if the future hopes of prosperity and higher standard are not to remain only a dream. One way to increase agricultural production is to bring more land under cultivation. However in this respect we seem to have reached the limit. Any more extension of cultivation cannot be done except probably by clearing more forest which will be like "Cure worse than the disease". The future hope therefore lies in increasing the agricultural production from land under cultivation. It is hardly realized that one of the main causes for low productivity of Indian soils and sinking of land resources is soil erosion. This will continue at an alarming rate if adequate steps are not taken to arrest this waste. Besides erosion soil deterioration has occurred due to misuse of land. That we have exploited and abused our soil resources is evident from the lowered fertility of our soil, decreasing land, vanishing forests, and overgrazed pastures, and increasing floods, and increasing problems of salinity and water logging, although the factual data on the extent of deterioration are wanting. All production is from the land. Basically therefore the economic stability of both the city and the rural population depends upon only how the farmers use and care for the land. Our nation will be as rich and as strong as its land resources.

1.2 Erosion is the result of the impact of climatic factors such as rainfall, wind and frost on the land under varying conditions of slope and natural vegetative cover. Except on flat sandy soils in plains and with a very low rainfall, no rain water enters the soil without moving over the surface. With increased rainfall and undulating topography, moving water cuts deep channels in the soil and carries away large quantities of soil and organic matter when the lands are bare of vegetation. When the fertility is lost only something is lost as it may be possible to replace it by increasing fertilizer application, but when the soil is lost every thing is lost. We cannot restore the soil after it is lost. The top soil once removed, cannot be restored by any practical means known to mankind.

1.3 The carrying capacity of running water or its eroding capacity increases considerably with velocity which depends on the slope characteristics. Other things being equal, (theoretically) if the slope is increased 4 times the velocity increases two-fold. Doubling the velocity increases scouring capacity four times, the carrying capacity by 32 times, and the size of particles carried by 64 times. If the velocity is trebled the capacity for size particles carried by the flowing water goes upto an alarming figure of 729 times. Water moving at a velocity of 3 inches per second will carry only clay particles and at a velocity of 8 inches per second it will carry sand and at 2 feet per second it will carry average sized pebbles.

1.4 It is a mistaken notion that the lost fertility of the soil due to erosion can be fully restored by the application of fertilizers. The fine and the most active soil constituents e.g. clay and humus components which are washed out most readily with surface run-off, cannot be made good. Of what use will the improved practices be if the soil, which is the physical basis of production is allowed to deteriorate? In the planning for stepping up agricultural production while the use of better seeds, adequate fertilizers, improved cultural

practices are being emphasised as the means of increasing agricultural production, it is unfortunate that the special conservation of aspect of/soil and water is not given due importance that it deserves. In fact for all agricultural planning, soil conservation is the most basic measure and other recommendations are only complementary to it. If soil deterioration is allowed to continue at the present rate, it will be increasingly difficult, nay even impossible, to maintain the present level of production, let alone the increased production which is envisaged in the plan. Failure to act in the past has already caused serious impoverishment of large tracts of agricultural land in the country.

1.5 The loss of soil fertility only reduces the crop yields while the loss of soil leads to destruction of the very foundation for agricultural production. The reduction of the depth of soil on account of erosion lowers the crop yield both on account of lowered fertility and reduced capacity for absorption and retention of soil moisture. The productivity of soil depends on the depth of the top soil. This is clear from the following data.

Effect of depth of top soil on yield of corn and oats.

Top soil in inches	Annual average yield of corn in bushels per acre for the period 1943-47			
	Oats	%age	Corn	%age
2	18.8	58.4	49.6	71.2
5	24.9	77.3	61.3	88.0
8	32.2	100	69.7	100

* Data from Georgia (U.S.A)

Yield of Sorghum as affected by depth of soil

Average of 7 years Lbs/acre

	Deep soil		Medium Soil		Light Soil	
	Above 18" depth	% age	9"-18" depth	%age	Depth 9" and below	%age
Grain	242	100	169	69.9	69	28.5
Straw	513	100	408	79.5	241	47.0

@ Data from the Dry Farming Station Sholapur.

1.6 The water that runs off the surface, deprives the sub-soil streams and springs of their source of replenishment & the water level in wells goes down. Such underground resources and

springs go dry in non-rainy seasons leading to drought conditions and thereby add to the uncertainty of successful agriculture in arid and semi-arid regions. The silt load brought down by run-off from catchments adds to the flood hazard by lowering the normal carrying capacity of natural rivers and streams. Silting action of reservoirs also reduces the usefulness of irrigation & power projects. The economic & social impact of soil erosion & deterioration is also considerable. It causes tremendous damage to 10 major classes of public and private enterprises and the general welfare - These are "(i) Public health (ii) public and industrial water supply (iii) fisheries (iv) valley agriculture (v) drainage (vi) irrigation (vii) Flood control (viii) river commerce (ix) recreation and (x) electricity production." The soil that runs down the slope, down the rivers, down into the ocean carries along with it the greatest asset bestowed upon a man to make a living from the land. A rewarding rural life is a bulwark of our nation. To maintain this we must defend our soil. The goodness of land and its capacity to produce rewardingly are the power and hope of our democracy.

1.7 Historical and Archeological evidences lead us only to one conclusion that ^{the} nations that have not taken care of their land resources have been extinct. The ruins of Taxila and Harrappa, the deterioration of Surat once a flourishing sea port and the famine scared areas of Bijpur once the capital of a flourishing Kingdom bear testimony to the above. Evidences further show that as early as the time of Alexander, The Great, there were thick forests and well populated cities in the North of Kutch and the South of Punjab which now form a part of the Desert of Rajputana. All this happened due to wind erosion as a result of misuse and abuse of land. The land is like an important document which bears testimony to man's achievements. A nation writes its record on the land. It is axiomatic "Civilization is rooted in the soil".

1.8 Conservation agriculture therefore preserves the basic land resources - it increases the crop yield and helps to maintain

and enhance the productive potential by scientific methods of farming e.g. good tillage, good seed and adequate fertilizer application. Crop cutting experiments in the scarcity areas of Bombay have indicated that soil and moisture conservation measures combined with dry farming increase the yields by 100 percent and more. These results in fact will apply more or less to other rainfed areas in the country. India can be strong and rich only if its land resources are fully conserved.

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CHAPTER I I
NATURE AND EXTENT OF THE SOIL CONSERVATION PROBLEM

2.1 Our immediate problem exists in the agricultural land in the rain-fed areas where annual crops provide the least protection against hazards of erosion. Over 1/3rd of the area in this country gets scanty rainfall which sometimes leads to conditions of scarcity and famine. Due to the absence of conservation farming large areas have already deteriorated beyond cultivation and in many more areas production has gone down considerably. Problem also exists in the irrigated areas where soil deterioration is taking place due to rise in sub-soil water level and development of saline and alkaline soils. Other problem areas are fallow and uncultivated lands which are generally neglected. Overgrazing and indiscriminate cutting of forest trees are the chief factors contributing to erosion and soil deterioration in the catchments of river valley projects which have great stake in the national economy and the flood control schemes. The economic life of these projects depends on the extent to which they could be protected from silting resulting from the soil erosion in their catchments. Floods are the indirect result of soil erosion in the water-sheds. It would thus be seen that building prosperity of our country through flood control and River Valley projects is largely dependent on soil conservation measures in their catchments.

2.2 Soil erosion is a serious problem in Hilly areas. The chief contributing factors are overgrazing, deforestation and shifting cultivation and indiscriminate extension of cultivation. Areas which should remain under permanent forest or grass cover, are opened for cultivation without due protection to the soil from erosion. Soil erosion taking place in hilly region affects areas beyond its borders. The western Desert of Rajasthan presents a formidable problem of wind erosion. It endangers deterioration for vast areas of the fertile Gangetic Plain along its eastern periphery. Along the banks of many rivers particularly Chambel, Yamuna, Mahi and Sabarmati in Rajasthan, Madhya

Pradesh, Uttar Pradesh and Bombay and in the deltas of peninsular India, large areas of fertile agricultural land are completely ruined by gully erosion. These gullies called ravines, still keep cutting in fresh lands every year. In Rajasthan, Madhya Pradesh and U.P., besides being an economic problem, the ravines are a big social problem as well as they serve as hide-outs for dangerous dacoits and out-laws.

2.3 The major soil conservation problems of India could thus be classified as those pertaining to:-

1. Agricultural land.
2. Catchments of river valley projects & flooded basins.
3. Hilly areas.
4. Western Desert of Rajasthan.
5. Ravines.
6. Poorly drained areas under irrigation.
7. Other waste lands.

2.4 Before soil conservation measures could be taken on any piece of land or field or watershed basis, we need to know the characteristics of the soil, the condition of the slope, the present vegetative cover, the present state of erosion, the present land use. Besides, for proper land use it is essential to know the fertility status of soil, the land use capability for various purposes like irrigation, forestry pasture development and crop husbandry. Thus a soil survey and land capability classification is a pre-requisite for soil conservation programme.

2.5 Research is an important arm of coordinated programme of soil conservation. There is a great diversity of land, each needing a different type of land use planning. For the success of a national programme by soil and water conservation a continuing programme of integrated research is essential. Research must not only find new and efficient methods but that the methods found should accord well with the social and economic needs.

2.6 A successful programme of demonstration and extension of soil conservation would require well trained personnel. To advise and help farmers in their farm planning and even to convince them of the usefulness of soil conservation measures, an on-the-spot well trained Soil Conservationist is needed. Therefore a sound

programme of training in soil conservation is very essential. The solution of the problem of soil conservation therefore lies in an integrated programme of survey, research, training, demonstration and extension of soil conservation methods.

2.7 From the foregoing discussions it would appear that the problem before us is

1. To preserve the lands which are not affected by deterioration.
2. Prevent further deterioration of affected lands.
3. To reclaim and restore the lost productivity of deteriorated lands and further enhance their productivity on a sustained basis.

The works to be undertaken to achieve this are :

1. Soil Conservation, survey & land use planning.
2. Research, Demonstration and training.
3. Soil Conservation in agricultural land.
4. Soil conservation in catchments of river valley projects.
5. Soil conservation in watersheds of flood control schemes.
6. Soil conservation in Desert areas.
7. Soil conservation in Hilly areas.
8. Reclamation of Ravines.
9. Reclamation of saline and alkaline lands.
10. Reclamation of waste lands.
11. Percolation tanks for water conservation and water spreading.

2.8 Tackling the soil conservation problem of the country is a stupendous task. Considering the magnitude of the problem and its importance in the economic stability of the country, the programme has to be phased in time assigning proper priorities. Tentatively it is proposed to spread the programme over Seven Five Year Plans which would have for their target 200 million acres of land as indicated below:-

Plan	Period	Target in million acres	Percentage of total target	Progressive total acreage in million acres.
II	1956-61	4.50	2.25	4.5
III	1961-66	10.5	7.5	15.0
IV	1966-71	20.0	17.5	35.0
V	1971-76	40.0	37.5	75.0
VI	1976-81	60.0	65.5	135.0
VII	1981-86	65.0	100.0	200.0

The above targets may vary depending on the urgency of the problem.

The following order of priorities is suggested:-

1. Agricultural land - precedence to be given to areas having greater potentialities for increasing food production.

2. Catchment areas of river valley projects, for the ~~an~~ obvious reason that considerable investment is made in these. The economic life of these dams and their potentialities for future development would depend on the soil conservation measures in their catchments.
3. Water-sheds of flood control schemes.
4. Desert.
5. Hilly areas.
6. Ravines.
7. Waste lands - Saline and alkaline lands and fallow and other uncultivated land.

2.9 In order to achieve the various targets for soil conservation envisaged in the foregoing note and the long term potentialities of the same for increased agricultural production and employment prospects, the specific schemes proposed in the Third Five Year Plan are discussed in the following chapters. In these proposals is also discussed the progress of soil conservation upto date, the likely bottlenecks and the steps that need to be taken to step up the tempo of the work.

1 INTEGRATED SCHEME FOR ALL INDIA SOIL AND LAND USE SURVEY

3.1.1. Scientific survey and classification of the soils of a country is needed for a proper understanding of the kind of soils, their potentialities and limitations for effective exploitation and rational land use. It has, therefore, been recognised that an appraisal of the soil resources of India is a prerequisite for the development of agriculture on sound scientific lines and therefore soil surveys have become an integral part of an effective agricultural programme.

3.1.2 The broad objectives of soil survey are both basic and applied. The basic aspect of soil survey is to build up a thorough knowledge and understanding of the soils, to determine the various important characteristics for classifying them into units and to map them with appropriate legend, nomenclature and terminology. The applied objective of soil survey is to study and map the soils of the village lands, irrigated areas, the catchment areas and the like, to enable the preparation of land use plans for the following purposes:

- (i) developing the land under cultivation.
- (ii) bringing new lands under cultivation.
- (iii) drawing up plans for lands brought under irrigation of reclaimed from water-logging, and salinity hazards etc.
- (iv) better utilisation of the lands under forests and pastures.
- (v) for general use pattern of land for urban and rural development programme such as making of bricks, tiles, drains, roads etc.

3.1.3 Hitherto different types of surveys e.g. irrigation survey, soil conservation survey, soil fertility survey etc. were being carried out by different agencies e.g. States, River Valley Projects, Forest Departments etc. However these surveys were wanting in uniformity of methods and nomenclature. The information from such surveys would therefore be incomplete and in any case not commensurate with the time and money spent.

3.1.4 In the interests of economy and uniformity of the work, it was considered necessary that there should be only one Central Organisation to undertake and formulate the techniques and policy of various types of soil surveys. Therefore from March 1953,

the Central Soil Conservation Board started an integrated scheme for All India Soil and Land Use Survey, and placed under the administrative control of the Director, Indian Agricultural Research Institute. The work is being carried out under the supervision of a Chief Soil Survey Officer, through regional centres located at Delhi, Nagpur, Calcutta and Bangalore, each under the charge of Soil Correlator. The scheme also includes a Cartographic laboratory at the Indian Agricultural Research Institute for processing and printing soil maps. The general programme of Soil and Land Use Survey in the country was received by the Soil Scientists in India in consultation with Dr. C.E. Kellogg, Assistant Chief, Soil Conservation Service of U.S.D.A. who visited India early in 1952.

2.1.5 The plan of the work consists in carrying out, generally, standard detailed soil surveys with mapping on 16" = 1 mile or 8" = 1 mile scale maps or reconnaissance survey with mapping in the scale 1" = 1 mile in the catchment areas of the River Valley Projects, commanded areas under the canals and cultivated areas. It is programmed to cover about 150 million acres by detailed and reconnaissance survey by the end of the Fifth Plan period.

2.1.6 Under the scheme integrated All India Soil Survey and Land Use Planning priority for survey is given to catchments of major river valley projects and areas under the canals and some cultivated areas. There is immediate need for survey in the agricultural land and the problem areas for adoption of proper land use practices. This problem concerns the State Governments the most. The survey of these areas would be carried out by the States as a part of the Integrated All India Scheme on standard pattern and by the procedure laid out on an all India basis. The work will be done under the technical supervision & scrutiny of the integrated scheme partly. The total area that is likely to be covered by the integrated all India soil survey scheme would be about 150 million acres in the

agricultural land to be covered by States on a phased programme by the end of 5th Five Year Plan. Thus by the end of 5th Plan period it is expected that the survey of the problem areas would be completed.

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2.2.1. Soil Conservation is an important agricultural science.

While considerable progress has been done in U.S.A. and some other countries in the application of this science to preservation of natural resources of soil, it is just beginning to be known in India. Nation must, therefore, capitalise on the experience gained in other countries. But side by side we must develop new techniques by research to suit our conditions and specific problems.

2.2.2. Soil Conservation, truly speaking, is peoples programme.

Land belongs to millions of tillers. In the final solution of the problem, soil conservation measures are to be adopted by the farmers. In the democratic set up as that of ours, State or Central Government cannot force the farmers to do anything. The Government can certainly educate, suggest, advise, guide and help. The average farmer does not understand the deep significance of the waste due to lack of soil conservation measures, nor does he realise the loss that soil erosion has caused. To him this is the act of God and so he feels he must bear it. It is essential to develop an intelligent understanding of the value and importance of natural resources in terms of individual and National life. Only out of such an understanding the impetus to act will arise. Thus the education of the farmer is the essential aspect of the success of soil conservation programme. However, it must be realised that soil conservation is quite a new field in which appreciation of methods and their values are not yet understood by many. Therefore, more than mere suggestion what our farmers need is to know how to do the job and what are the real benefits of such measures. This requires field demonstrations. Each demonstration should represent the cross-section of the problem representative of a large area. The technical skill will be pooled to attack the problem simultaneously along several fronts - agronomy, engineering and forestry. Even profitable research must grow out of farm. Research must take into consideration the real problem, and the various physical economic and social limitations of the problem. The predictions from

the laboratory data can be made only on the basis of all the characteristics of a soil and its environment. Thus research and demonstration are the important links for successful solution of soil conservation problems.

2.2.3. With regard to research, and Demonstration Centre will concentrate mainly on the major regional problems of the country e.g. of the desert, the ravines, the hilly areas including the foothills of the Himalayas and the Siwaliks, the black cotton soil and red and laterite soil regions.

2.2.4. For execution of soil conservation demonstration projects to assist farmers in planning and execution of soil conservation practices on their fields, trained personnel will be required in large numbers. In fact the actual progress of soil conservation in the field will be limited largely by the availability of trained personnel. Execution of soil conservation programme will need contour survey of the area, mapping, planning and execution of soil conservation works. This would require technical personnel of different categories e.g. Officers who could be in the over all executive charge of the scheme, Assistants and Sub-Assistants for survey, planning and execution of works in the field. From the experience gained in Bombay State which is pioneer in soil conservation work, it is felt that a unit staff consisting of one Officer, 5 Assistants and 20 Sub-Assistants will be able to handle about 5,000 acres a year. However, with experience, the area of management per year may gradually increase to a maximum of about 7,500 acres. The Central Government has on the programme training of Officers and Assistants. Sub-Assistants' training is the responsibility of the States.

2.2.5. Apart from the regional problems of research & demonstration in soil conservation that the Centre will tackle the States have many specific problems of soil conservation which will vary from State to State due to varying conditions of rainfall, topography, economic and social factors. It is necessary, therefore, ^{that the} State Governments will also have to intensify their programme of the research and demonstration along with their extension work ^{for} soil conservation. Besides the State

will have to make adequate arrangements for training of their Sub-Assistants to meet the requirements adequately.

3 SOIL CONSERVATION & DRY FARMING IN AGRICULTURAL LAND

3.3.1 Soil, plant and animals are the three components of ecological balance. In nature this balance is perfectly maintained. Vegetation protects the soil against nature's own enemies wind and water. Soil erosion taking place in nature proceeds at a very slow rate known as "geologic erosion" and is a soil building process. Accelerated erosion begins when this balance is disturbed by faulty agricultural practices, overgrazing and over-felling due to increased pressure of population. This balance is upset the most in the cultivated fields where annual crops provide very little protection against wind and water. Soil erosion is a problem of national importance today. Vast areas have been rendered completely useless for production and on many more areas profitable agriculture is becoming increasingly difficult. The havoc of flood & drought are the indirect consequences of soil erosion. The factors which have generally contributed to the hazards of soil erosion on agricultural land are the topographical features, rain fall characteristics, agricultural practices characterised by cultivation down the slopes, systems of bare fallowing during rains, and absence of legumes in rotation and overgrazing of lands. At the root of poorly developed farming methods are the small and fragmented holdings.

3.3.2 Although there is a lack of factual data to indicate the extent of erosion problem in agricultural land, the seriousness of the situation could be well-gauged from the experimental data collected at Dry Farming Stations e.g. Sholapur(Bombay), Hagari(Madras), Raichur(Andhra Pradesh) and Rohtak(Punjab). Most of the cultivated area in the rain-fed tracts lies in the undulating tracts of the Deccan plateau, the black erodible soils of Central India, Himalayan and Sub-Himalayan regions of the North and undulating areas of red and laterite soils of dry zones of Bihar, Orissa & West Bengal. When it is borne in mind that water from unprotected slopes of even 1 to 3 percent (1 to 3 ft. fall in 100 ft. length) can run fast enough to

transport large quantities of clay, silt and organic matter, it can be realised that very little of the farm land and grazing areas in the above tracts which has been devoid of the adequate protecting vegetative cover on account of faulty agricultural practices and overgrazing and over cutting of forest trees, could be free from erosion and soil deterioration. In fact, observations made at Soil Conservation Research Centre, Rehmankhara (U.P) indicate that on the alluvial soil which form major part of East Punjab, U.P., Bihar & West Bengal, with the increase in slope beyond 8 ft. per mile (.15 percent) the productive capacity of the soil decreases due to deterioration in soil fertility, moisture deficiency brought about by excessive run off and low retentive capacity of the soil on account of low organic matter content.

2.3.3 A sample survey conducted in Bombay revealed that 71 percent of the total cultivated area was severely eroded, of which 26 percent had been rendered useless for agricultural purposes. In another survey based on land record data it was found that in a period of 75 years from 1870-1945 about 70 percent of the land had changed from a "deep soil" class (more than 18" deep) to "medium soil" class (9"-18" deep). Studies on loss of plant nutrients and soil also indicated a very alarming situation. As an average of 5.4 million acres of rabi Jowar area, the loss of nutrients was estimated to be of the order of 300000 tons of nitrogen and phosphoric acid and ten times this quantity of potash. Calculated in terms of crop production it will mean a loss of 11, 47 and 91 million tons of sorghum when each element is considered individually. Studies on soil loss indicated that under cropping with rabi jowar with no soil conservation measures, it took just 27 years to erode top 7 inches of soil. Surely this will be at a rate faster than scientific development can make good the resultant loss in food production. While these figures need not be taken as absolute for the entire country, nevertheless they indicate the seriousness of the problem. The gravity of the situation is further complicated by the increasing pressure of population on land.

8.3.4 Major hazard of soil erosion exists in rain-fed areas. There are vast areas where agriculture is dependent on rainfall which is both scarce and erratic. In countries with low and precarious rainfall - two types of agriculture are usually met with, one is crop production or arable farming and the other animal husbandry including the management of grazing areas. In some countries it is considered that such drought areas are more suited to animal husbandry. This may hold true where human population is limited and where areas available are extensive as in Australia, South Africa and some States of U.S.A. In India with a higher population with limited area available for cultivation per head and in the absence of other alternative occupations, arable farming has to be resorted to. The question of frequent scarcities and famines in India was made the subject of critical enquiry as far back as the year 1880 when the First Famine Commission was appointed. One of the important recommendations of the Famine Commission was that protective Irrigation Project should be established for the benefit of dry tracts. This recommendation of Commission was accepted by the Govt. of India. This method of protection cannot however be extended to cover all the areas. By the end of Second Five Year Plan the target for irrigation would be about 87 million acres including private wells leaving more than 2/3rd the cultivated area at the mercy of timely and adequate rainfall. Future hope for increased agricultural output will therefore depend greatly on these areas.

8.3.5 Major problem areas in India exist in

1. Peninsular India comprising of Central India plateau and Deccan plateau excluding the narrow strip about 30-40 miles in width along the Western Ghats and a broader strip of about 100 miles width along the eastern Ghats. Most of this area receives low & erratic rainfall.
2. Himalayan and Sub-Himalayan region of Punjab, U.P. Pepsu and Jammu & Kashmir and Himachal Pradesh.
3. Plateau land of South Bihar, consisting mainly of the districts of Palamau, Hazaribagh, Santhal Paraganas, Ranchi, Singhbhum Manbhum.
4. Comparatively dry and undulating areas of red and laterite soils in Orissa, West Bengal. The areas

needing soil conservation in West Bengal are the districts of Darjeeling, the portions of the districts of Murshidabad, Bankura Burdwan and parts of Midnapur comprising the tract known as the rarb region having the appearance of a plateau. This is comparatively a dry region and has low precipitation. In Orissa major soil conservation problem exists in the areas comprising of Angul Sub-Division, Sambalpur district together with Koraput and Ganjam. The general characteristic of this area is exactly the same as the adjoining division of Chota-Nagpur in Bihar. It is in the latter region that because of the general undulating topography, soil erosion is a serious problem.

2.3.6 In the above region almost all the areas excluding those that are under paddy or which receive irrigation need protection. Total cultivated area in the above region excluding the areas under paddy and under irrigation comes to about 143 million acres as shown below:-

	In million acres 1953-54
1. Peninsular India	
(a) Deccan Plateau	92.005
(b) Central India Plateau	37.218
2. Himalayan & Sub-Himalayan area	10.302
3. Red & Laterite Soils	3.715
	143.240

2.3.7 All the above areas would need soil conservation and dry farming practices. Out of this at least about 100 million acres could be regarded as problem areas that would need immediate attention. Measures needed would be contour bunding, terracing, gully control, putting engineering structures for safe disposal of a run off, combined with follow-on practices e.g. strip cropping, soil building rotation, use of good seed, adequate manures and fertilizers and dry farming practices for conservation of moisture etc. Soil conservation measures in agricultural land would cost about Rs. 60/- per acre.

2.3.8 The effect of soil conservation & dry farming methods in increasing the agricultural production in the scarcity areas is tremendous. This is evident from the dry farming research and extension demonstrations conducted at four Dry Farming Stations in India, Sholapur(Bombay), Hagri(Madras), Raichur(Andhra Pradesh)

and Rohtak(Punjab). Summarising the work Kanitkar has concluded as follows:-

1. Contour bunding substantially increased the moisture absorption and reduced soil loss by erosion, resulting in increased yield.
2. In Bombay, bunding increased the yield of Sorghum by 35 percent in the first year. The increase was much higher as the years passed provided the bunds were properly maintained. This was due to the progressive built up of soil fertility on account of prevention of soil losses by erosion. At Raichur, mere bunding gave an average 22 percent higher grain yield. The benefit of bunding was more conspicuous in the year of low rainfall, when the grain yield was 44 percent higher in banded than unbanded field. The average increase in low rainfall year was 247 lbs. per acre or about 0.11 tons per acre. At Hagri the increase due to bunding was about 100 lbs. each of grain and straw of Sorghum and 42 lbs. of cotton. Similar trials at Rohtak increased barely yield by about 250 lbs. and gram 72 lbs. per acre. On an average yield increases due to bunding are taken to be about 0.04 tons per acre which is about 25% of the yield in scarcity areas.

2.3.9 The combined effect of bunding and dry farming which includes, proper seed bed preparation, light manuring every third year, use of improved seed, wider spacing, crop rotation and inter tillage, was greater absorption, greater conservation and greater utilization of moisture by the crop and consequently the substantial increase in yield. At most Centres the yields were nearly doubled. On the basis of these findings it would be seen that protecting all the agricultural land in the problem areas indicated above and extension of dry farming methods would increase annual agricultural production by nearly 22 million tons. Besides the direct effect of soil conservation and dry farming in increasing the agricultural output its long term effects in conserving the soil and fertility cannot be over-emphasised. Thus soil conservation and dry farming in agricultural lands can be regarded as a productive investment which pays dividends at compound rate of interest.

2.3.10 The tremendous improvement that soil conservation and dry farming will have on the agricultural production and the economy of the country as a whole are quite evident from the fact that about 27 percent of cereals, 32 percent gram, 40 percent oil seeds, 39 percent cotton and 28 percent sugarcane is grown in

these dry areas. These areas account for 1/3rd the cattle and buffalo, 50 percent sheep and 42 percent goat population of India. According to 1951 statistics, dry areas accounted for population of 106 millions. Every million acre in the agricultural land that will be protected by soil conservation measures will provide employment potential of unskilled labour equivalent to 20 million mandays.

4. SOIL CONSERVATION IN RIVER VALLEY PROJECTS.

2.4.1:- For planned economy with the object of raising the standard of living, river valley projects have considerable significance. In an agricultural country where successful agriculture depends largely on the vagaries of rain, increased irrigation and power potential undoubtedly need hardly any emphasis. This is all the more important to keep pace of increased production of food and consumer goods with a rapidly growing population.

2.4.2:- The economic life and the usefulness of the river valley projects will depend on the extent to which they will be protected from silting, that would take place on account of erosion hazard in their catchments. By and large at present the catchments of River Valley Projects are in a deteriorated condition and the hazard of erosion is considerable. Data on silting collected for some of the existing tanks in Bombay and Uttar Pradesh is clearly indicative of this deteriorated condition. On an average rate of silting varied from $\frac{1}{2}\%$ per year to as high as 2%. In the South, Katteri Lower Lake which supplies water and hydro-electric power to the Cordite Factory near Ooty, over past 50 years has silted up lowering its capacity by one half causing it necessary to augment power from the Pykara Hydro-Electric Power Station.

2.4.3:- Based on the silt data collected for 1949 it was estimated that life of Panchet Dam would be only 25 years. On the basis of silt data for 1950 the life was estimated at 32 years. In the life of a young nation a period of 30 or 50 years is too short on which to plan the future economy of the country. Such alarming situations are apprehended on many river valley projects. The silt load brought down by Kosi is estimated to be of the order of 1.00 lakh acres feet per year. Investigations conducted by the Central Water & Power Commission reveal an abnormally high rate of silt yield per unit area; higher than any other river in the world including the Yellow River of China. These River Valley Projects have considerable stake in the Nation's future economy. The above data only shows very clearly that unless adequate soil conservation measures are adopted in the catchments of River Valley Projects, the future economy may be badly jeopardised.

2.4.4:- There are about 61 million acres forming the catchments of major River Valley Projects:-

P R O J E C T S .

Catchment areas in Sq. Miles.

1. Kosi.	23,858
2. Bhakra Nangal.	22,000
3. Hirakud.	32,200
4. D.V.C.	7,429
5. Gandhi Sagar.	8,670

6. Muchkud.

-----755-----
Total: 94,912 Sq. Miles.
Or 6,07,43,680 Acres.

Some of the above areas will no doubt lie beyond the snow-line and, therefore, erosion problem in those areas would not be of any consequence. Still there would be quite large areas, say of the order of about 25-30% that will require protection by soil conservation measures of varying intensity.

2.4.5:- Forest lands generally occupy the strategic position with in the water-sheds. They offer the greatest opportunity for effectively changing the hydrologic characteristics of the watersheds. Protection of existing forests, afforestation and prevention of factors which disturb the stability of forests e.g. overgrazing, forest fires, tree cutting, shifting cultivation area important points to be taken into consideration.

2.4.6:- As most of these areas are already in a deteriorated condition, they will need protection and stability by engineering structures - These may be trenching, drop spill-ways, chutes, drop in-lets and check dams etc. Where immediate control is necessary sediment tanks, and sediment traps may be necessary. Proper land use planning, adopting conservation farming where land is suitable for cultivation are important items in a water-shed protection programme. Cost for protecting catchments may vary from about Rs.50/- per acre for afforestation and Rs.150-200 for other engineering measures. The over all average cost may come to about Rs.100/- per acre.

2.4.7:- In view of the fact that River Valley Projects have considerable stake in the future planned economy of the country, this work has been given priority next only to agricultural land. In the actual plan of work, priority would be given to sore spots in each watershed which contribute the heaviest silt load. Further areas very near the dam will have to be tackled first as compared to distant ones. This would require survey of the catchments to locate and demarcate such spots. Under the Scheme for All India Soil Survey conducted by the Central Soil Conservation Board, Soil Survey is started in the catchments of River Valley Projects. Priorities are given to 6 Major Projects, Machkund, Hirakud, Chambal, Bhakra Nangal, Kosi and D.V.C. Total of about 78,000 sq. miles are to be surveyed. About 1.5 million acres would be surveyed every year. Since the commencement of survey work this year, 40,000 acres have been surveyed.

2.4.8:- It is difficult to estimate the production potential for Soil Conservation measures in the catchments of River Valley Projects. The advantage that will accrue in protecting and increasing the economic life of the dams and its effect on the agricultural production, power production and consequently the industrial development would be

really tremendous. Besides there would be more yield of wood for industrial, commercial and domestic use; there would be more grass, better, healthier and more productive live-stock. Every one million acres protected with Soil Conservation measures in the catchments would provide employment potential for about 30 million man days.

5. SOIL CONSERVATION IN WATERSHEDS (FLOOD CONTROL)

2.5.1 Floods are the indirect result of erosion taking place in the catchments. Water that flows through the catchments carries along with it large quantities of sand, silt, clay boulders etc. When it reaches the plains the velocity is reduced and most of the debris gets deposited. This reduces the carrying capacity of rivers and streams. The process has continued over ages. The rivers which once were deep & narrow, have become shallow and wide. Normally these rivers would be able to carry the drainage water from the catchments; But due to silting they are no longer able to carry the normal storm flow. Besides, with continued erosion going on in the catchments the quantity of run off increases with each storm. This causes the flood water in the rivers to overflow the banks and inundate the low lying lands.

2.5.2 Causes for erosion are overgrazing, indiscriminate exploitation of forest products, forest fires, indiscriminate extension of cultivation to high and precipitous slopes and the dangerous practice of shifting cultivation.

2.5.3 Floods are causing enormous destruction all over India year after year. For the period from 1950-56 damage due to floods in India was estimated at Rs. 36 crores in the Brahmaputra system, 157 crores in the Ganga system. Considerable loss also occurred along river systems of Central Indian and Deccan. During the 6 years the damage was estimated at Rs. 237 crores for the whole country, besides Rs. 45 crores relief by the States and the Centre. Besides this direct loss there was indirect loss to railways and other revenue earning enterprises and loss of productive man hours. Added to this was the loss of human and animal life.

2.5.4 The methods necessary for controlling the floods are

1. Works to store or detain the excess volume of flood flows comprising
 - (i) Reservoirs, and
 - (ii) Detention basins.
2. Channel improvements or enlargements for enabling the river to carry the flood flows at lower water levels.

3. Diversion of part of flood discharge into other natural or artificial channels and spillways, controlled or uncontrolled.

4. Raising habitations above flood heights.

5. Watershed improvements.

While items 1-4 fall under engineering measures, item five concerns soil conservation.

2.5.5 Flood problems arise not so much due to excessive flood discharge in rivers as due to excessive sediment load in the run off. If therefore, a basic remedy is to be sought to the flood problem in India, efforts will have to be directed towards reducing the excessive sediment which flows in the more damaging rivers. Conservation measures are designed to retard the flow of run off, to minimise soil losses and consequently the sediment load in the rivers. High Level Committee on floods appointed by the Government of India have recommended that proper soil conservation measures should be adopted in catchments of rivers and streams where flood control measures are undertaken. These recommendations have been accepted by the Central Flood Control Board.

2.5.6 Himalayas including the foot-hills present a more serious problem for flood hazard as they yield the heavy sediment through erosion and landslide. This has tremendous bearing on the well being & prosperity of the people in the Indo-Gangetic plain. Deccan Plateau has no serious flood problem as geologically it is one of the oldest region of the earth and river beds have more or less settled themselves. The flood problems of Sunderbans and of the deltas of the Deccan rivers have problems of their own. For such deltaic areas, soil conservation measures would not be effective for solving flood problems.

2.5.7 Based on the above considerations, the High Power Commission on Flood Control appointed by the Government of India has recommended the following priorities for soil conservation works for flood control.

- (a) Catchment areas of the multi-purpose dams.
- (b) Himalayas with their foot-hills.
- (c) Indo-Gangetic plain.
- (d) Deccan Plateau.

Emphasising the need for soil conservation methods for flood control the Committee has further remarked,

" No detailed and comprehensive soil conservation schemes with particular reference to flood control have yet been evolved and executed, though there has been a long correspondence about the preparation of such schemes and a large number of meetings have been held to discuss the procedural difficulties. A number of demonstration centres have been established in various States but not all of them relate to flood control. No single department has the responsibility with regard to soil conservation in relation to flood control, excepting Damodar Valley Corporation.

An important decision was taken by the Sub-Committee of Engineers at the Hirakud Seminar to recommend that an ad hoc provision of 2 to 5 percent of the cost of dam should be made in the project estimates, for soil conservation measures. A small provision should also be made similarly in the maintenance estimates for the reservoir, to meet continuing expenditure on such protective measures."

2.5.8 Soil conservation measures needed would be afforestation, controlled grazing and proper land use planning. As most of these areas are already in an advanced stage of deterioration they need engineering measures, contour trenches, check dams and debris basins, detention reservoirs and other engineering structures. Average cost per acre for these measures would be about Rs. 75/- for just correct land use measures.

2.5.9 The advantages of soil conservation and proper land management in the catchments of flood control projects do not restrict themselves to the diminution of flood discharge including sediment and reduction of flood hazard. They increase the agriculture yields of agricultural crops and increase the production potential of forests & grass land. Increase in the production potential that will accrue due to soil conservation measures in the watersheds will be appreciated when it is considered that on an average we are losing Rs. 50 crores annually by way of physical destruction of property, excluding expenditure on relief and rehabilitation, of flood victims.

This is besides the other indirect benefits by saving of productive man hours and benefits of many revenue earnings resources. If there were no floods our annual national income would go up by about Rs. 100 crores. Every million acre protected with soil conservation measures would provide employment potential for about 20 million man days.

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6. SOIL CONSERVATION IN DESERT

2.6.1 Nearly 50 million acres of Rajputana desert in the State of Rajasthan present a formidable problem of wind erosion. This area is a veritable "Great dust bowl of India". We have not only got the wind erosion problem in Rajputana, but also water erosion for want of a vegetative cover. One can see the formation of sand dunes & deep gullies.

2.6.2. South Western Rajasthan is an arid country with almost everywhere low rainfall of 5"-20" and rainfall is more in the east and it decreases as we go to west. The temperatures reach two extremes: in winter touching below freezing point and in summer going as high as 120° F (about 50° C). Water table is very low, at places it is 300-400 ft. deep. Evaporation is high and amounts to 120 inches per annum. The vegetation in the desert is sparse and there are no forests. Dairy products, cattle rearing & wool industry are the main industries of the people. They maintain large herds of cattle, goat, sheep and camels which graze all the year round. Stall feeding is not practised. Under the present condition the number of cattle heads maintained on land are much more than its carrying capacity. The grasslands are overgrazed and never given any rest to recoup. Trees in the past have been indiscriminately cut and whatever appear are grazed or trampled by cattle. Few scattered trees surviving from old hackling are still being felled for fuel as there is no control.

2.6.3. In these heavily grazed areas most of the good grasses have disappeared; those that are left are unpalatable, coarse and low yielding annuals which provide poor feed for the cattle. The vegetation which is both scanty and of poor type, provides very little protective cover against wind and water erosion. Overgrazed grasses have poorly developed root system which do not bind the soil effectively. Further loosening of the arid sands by moving herds of cattle makes the desert more vulnerable to wind erosion. Loosened sands are immediately carried by

the heavy winds during the dry hot months of March to June. Finer particles of clay and humus which are the source of fertility are carried over long distances even upto the hills. The coarser particles drift over shorter distance. Thus the sands besides being unstable lose their fertility as well. Moving coarse sands encroach on many fertile lands- rendering them less productive or unproductive. Many fields in the desert have badly deteriorated due to heavy sand deposit and still many more are threatened deterioration along the entire eastern boundary touching the fertile Gangetic plain. The unstable and drifting sands do not allow foot hold to any natural vegetation. They abrade whatever comes in their way. The sands pile against houses, highways and rail roads, causing considerable physical obstruction and financial loss. The magnitude of financial loss would be appreciated when it is considered that it costs to railways over Rs 5,000 to clear each mile of railway tract passing through sand dune areas.

2.6.4. The serious problem of wind erosion is the direct result of indiscriminate overgrazing. The products of animal husbandry industry like wool, meat, bones and milk ^{are} ~~is~~ obtained at the cost of overgrazing and indiscriminate grazing which is the cause of all deterioration of desert. Poor grass land can maintain only poor cattle.

2.6.5. From the point of view of agriculture and animal husbandry improvement of desert is of great importance. The tract is known for some of the fine breeds of milch cattle, draft animals, camle and sheep. Of the entire state of Rajasthan about 33 percent of ^{the} population, 33 percent of the cattle, 60 percent of sheep and 69 percent of goats is distributed in the desert portion.

2.6.6. Historical and archeological evidence show that the present condition of the desert is about 2000 years old. In the days of Alexander, the Great, there were well populated and flourishing cities in the North of Cutch and South of Punjab

which now come under the desert. The ruins of Harrapa and the findings of bones of elephants and rehenoceros suggest a flourishing riverine habitation and thick forests in that part of the country. Evidence further shows that desert was once drainage basin for many of the rivers of Indo-Gangetic plain.

2.6.7. It is evident from the above account that the so called desert was not really a desert. The present is no indication as to the past nor can it be taken as suggestive of the future. Since even in the drier areas of the west where vegetation is protected for purposes of religious sanctity, big trees of indigenous species in association with good grasses are seen in lush growth, indicating that even under arid conditions prevalent in the west, good vegetative cover could be established which will both protect the desert and give good fodder yield to maintain its live stock industry. Experiments at the Desert Afforestation and Soil Cons. Research Station at Jodhpur have shown that even closure alone of sand dunes, bare hills and rocky areas can bring about remarkable improvement of the area.

2.6.8. In the recent experiments in the arid areas of Saurashtra conducted by Dr. Albertson, T.C.M. Grass Land Adviser, it was shown that given proper management and care even under arid conditions grass lands rehabilitate surprisingly quickly. In these trials rest soil conservational measures and rotational grazing boosted the yield of grass lands from a low level of 500-600 lbs per acre to 2000-4000 lbs. The composition of grasses also improved remarkably. In the over-grazed land 86 percent of grasses were annuals and only about 14 percent perennials. In the reserved areas the percentage of annuals was 53 percent. These researches speak for future promises that the desert holds out when given soil cons. measures and good management. Grass land development work would be a pre-cursor for the dairy industry, specially in the old Saurashtra area which has a large number of flourish-

*High yielding, nutritive & good soil binding perennials was 47.

ing towns nearby. Problems similar to Rajasthan desert, exist along the coast lines, and in parts of U.P., Punjab, Madhya Pradesh and Bombay.

2.6.8 The problem of the desert(arid land)is not only a problem of India but it is a world problem. Arid and Semi-arid areas cover 1/3-1/4 of the land surface of the world. These areas have a great bearing on the economy of any country wherever they exist. Potential productivity of arid land is increasingly attracting the attention of all countries. The condition of arid land in any country is about the same. Research findings in India therefore will have a large orbit of appliation.

Significance of arid lands in the world economy becomes clear when it is realized that the world body like UNESCO has considered it necessary to initiate a programme of arid land research in India, Pakistan, Egypt and Israel.

2.6.10. In areas in the west with a rainfall of 10 inches and below, arable farming would not be adviceable. Such areas need to be developed largely as permanent pasture land. Areas where soil is retentive, arable farming with suitable dry farming methods can be practised. Areas with more rainfall and good agricultural land need to be developed for pasture combined with improved dry farming techniques. For protection of the agricultural land, the sands and sand dunes in the desert need to be stabilized. The problem of the desert can be classified as follows:-

1. Stabilization of drifting sands(Sand dunes).
2. Improvement, development and management of pasture for better carrying capacity and control of wind erosion.
3. Storage ponds & other water-storing works for improved grazing practices.
4. Afforestation and creation of shelter belts & patches of forests for moderation of arid condition, control of wind erosion, supply of fodder and fuel.
5. Developing techniques of dry farming.

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2.6.11 Stabilizing desert sands will prevent march of the desert and halt any further deterioration of good fertile land bordering Indo-Gangetic plain besides saving good lands of the desert. Rehabilitation of grass lands and development of pasture lands will considerably increase the grass yield of these lands and transform the present situation of maintaining livestock at semistarvation level to near production capacity, thereby increasing considerably the production of milk, wool & meat.

2.6.12 Afforestation and creation of shelter belts will moderate the arid conditions, conserve more moisture, supply fodder & fuel for local consumption. This will also help to save cow-dung for use in the fields than as fuel. Usefulness of shelter belts in this behalf has been shown by research and application in many countries like Canada, U.S.S.R., Netherland, Switzerland and U.S.A. The shelter belts on an average reduce wind velocity on leeward side over a distance equal to 40 times the average height of the belt. Some protection is also afforded on the windward side. Relative humidity and evaporation studies have shown that both relative and absolute humidities are higher in the protected zone covering 10-15 times the height of the belt. Similarly within a zone of 5-10 times the height of the belt, ~~relative humidity~~ evaporation is reduced although transpiration in this zone may increase; inspite of this, research has shown a beneficial effect in crop production as a result of shelter belts.

2.6.13 Improved dry farming techniques are found by experimentation to increase agricultural production by 35-50 percent and this is no mean achievement when our country faces a food deficit year after year.

2.6.14 Out of 50 million acres of desert land, about 35 million acres will be grass land and about 15 million acres agricultural land. Based on the results of Saurashtra, it may be quite

reasonable and realistic to expect that well managed grass land even in the arid areas will yield about 2000-2500 lbs. or about one ton of good grass per acre. Considering that the average ^{animal} of the desert will consume about 25 lbs. of dry fodder per day, about 9 million heads of cattle can be maintained at full production level. This potential will increase progressively with improved fertility due to continued good management of grass land.

2.6.15 In the agricultural land, Soil Conservation and dry farming techniques would increase the agricultural output by about 50 percent or about 0.08 tons per acre. For 15 million acres, the food production potential would increase by 1.2 million tons. Stabilization of desert will better the lot of about 5 million people inhabiting these parts.

Every million acre of Desert protected by soil conservation measure will in addition provide employment potential to 10 million man days.

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7- SOIL CONSERVATION IN HILLY REGION

2.7.1. In the Himalayan and Sub-Himalayan tracts of Northern India, the Western and Eastern Ghats and the spurs of these hill ranges in the country, steep hilly areas are being mis-used and mis-managed for Agriculture, grazing and exploitation of forest products resulting in serious soil erosion. The chief causes of the deterioration on the hill sides are the dangerous practices of shifting cultivation, over-grazing, indiscriminate felling of forest trees, extension of cultivation to steep and unprotected slopes. Erosion in hilly areas besides lowering the production potential of these areas for food crops, fodder and fuel is fraught with serious consequences in the plains down below. Devastation caused by hill torrents e.g. "Chos" in Punjab and floods in the plains are the indirect result of erosion and run-off taking place in the hilly areas which form the catchments of river systems. Over-grazing and indiscriminate felling of forest trees is to say the least a common feature in most hilly areas. Denudation of Siwalik hill ranges in the Punjab has affected about 550 sq. miles by "cho" during 45 years from 1896 to 1939. In the South near Ootacamund over a period of fifty years the capacity of Katteri lake which supplies water and hydro electric power to the cordite factory has gone down by nearly 50 per cent.

2.7.2. Cultivation in hilly areas has extended indiscriminately to steep and rolling slopes which need to remain under permanent cover. No protective measures whatsoever are followed in most of the lands and in some areas only defective measures like irregular terraces sloping outwards, earthen bunds which are mostly along the boundry of the field and shallow and oblique drains at great interval are being followed. On the other hand, all pro-erosion practices like cultivating up and down the slope, growing the same soil exhausting crop year after year, sometimes taking even two

or more crops every year and the like are freely followed. All these have further aggravated the problem and the lands in such hilly regions are affected by all kinds of soil erosion e.g., sheet, rill and gully. In a majority of these areas the soil is very shallow and in some no top soil exists at all.

2.7.3. Shifting cultivation is an example of extreme case of erosion taking place in the hilly areas. In the practice of this system, steep slopes are cleared ~~at~~^{of} the forests and opened to cultivation without following any soil conservation practices. The land is kept under plough like that for a few years and then abandoned in favour of other areas. During the time that the land remains under plough serious erosion continues resulting in the loss of top soil with the result that even^{when} the area is reverted to forest natural regeneration becomes difficult.

2.7.4. The problem of shifting cultivation is quite serious in the hilly areas of Assam, Orissa, Andhra Pradesh, Chota Nagpur and Madras. In Orissa alone nearly 1200 sq. miles are known to have been affected.

2.7.5. Conservation of natural resources in the hilly areas requires a proper land use programme combined with soil conservation measures. In the outer Himalayas, the Western Ghats of Bombay (Deccan), the Nilgiris, the upper and lower **Palanis** and the West coast in Kerala, South Kanara etc., crops like paddy, potato and tapioca respectively are grown on steep slopes. Except in the Nilgiris and the lower **palanis** the lower fringes of the hill slopes including the flat or slightly sloping valley bottoms are terraced and paddy crops are grown. Though constructed on a straight line and in odd bits, the terraces already constructed for growing irrigated paddy or other crops will require minor modifications as these have already been well levelled and bunded to facilitate irrigation and are fairly well protected. The lands situated on the higher

slopes and those put under rain-fed crops are uniformly neglected, and all hazards of soil erosion explained already are prevalent on these lands. These lands require protection immediately on the basis of planned land utilisation i.e. according to the capacity of the land to produce combined with consideration of its economics.

2.7.6. In the Nilgiris, the Palanis and the Himalayan regions where potato which is a cash cum food crop, can be grown, it is proposed that the lands on the steep hill slope suitable for agricultural crops may be bench terraced. In other areas, bench terraces are proposed to be constructed only where paddy can be grown or where the crop grown can fetch enough economic return to amply compensate the high cost involved in the construction of bench terraces within a reasonable period. In the absence of such economic crops, the lands on steep hilly slopes will be put under trees, grasses or plantation crops like tea, coffee, pepper etc, according to local conditions. Since most of the barren lands on such steep slopes are already affected by severe soil erosion, it is necessary to provide mechanical erosion control structures like contour trenches, check dams, retaining wells and other torrent control works.

2.7.7 No factual statistics are available for the extent of hilly areas that need to be protected by soil conservation measures. This will be known correctly after the soil survey now under way is completed. However, ^{approximately} ~~xxxxxxx~~ ~~correctly~~ ~~guess~~ the total area may be placed at about 40 million acres. Out of these about 15 million acres would be such as may be developed for agricultural purpose by proper bench terraces, contour trenching etc. The balance of 25 million acres may be developed for a forest or grass crop.

2.7.8. The cost of bench terracing and trenching works proposed on hill slopes depends upon many factors like terrace specifications, slope, soil etc. From the experience gained

On similar works at Research Centres it is estimated that such works on hill slopes will cost on an average Rs.400/- per acre.

2.7.9. Protecting 15 million acres in the hilly areas suitable for food and cash crops, by intensive soil conservation measures will have a great potential for increased production. Experiments at the Ootacamund Soil Conservation Centre have indicated an increase in yield by 40-50 per cent for potato. On an average an increase in production of 25% may be expected. The entire work can be done by manual labour where available. Every million acre in hill areas protected by intensive soil conservation measures, e.g., bench terracing when carried out by manual labour would provide employment potential equivalent to 200 million man days.

8 SOIL CONSERVATION IN RAVINE LANDS

2.8.1 Large areas of fertile alluvial land along the banks of rivers notably the Yamuna, the Chambal, the Mahe and the Sabarmati have gone out of cultivation due to severe gully erosion into ravines. Ravines are also quite a serious problem along many other river banks e.g. Tapti in Khandesh, Krishna and Bhima in Bombay Deccan and Tungabhadra in Mysore. The nature and extent of erosion in these areas is indicative of advanced stage of deterioration that has continued over years. Ravines are noted for their enormous size and depth. Some ravines are shallow being only 5-10 feet deep. The deep ones vary from 60 to 100 ft. in depth. Some ravines are dead and that during flood season no water rushes in but the ravines along Chambal in Rajasthan are active with water rushing in during flood season.

2.8.2. Some years back all these ravines were good agricultural land. They have gone out of use due to mis-management of lands in the catchments combined with action of water from the watershed and in the river. Overgrazing and cultivating the land upto the edge of the bank exposed the soft alluvium to serious hazard of soil erosion. Due to the uncontrolled water coming from the ridge side and fluctuations in the levels of main river i.e. by the eroding action of the rain and river water the soft soil gets eroded, thus throwing large areas out of cultivation. With continued erosion the gullies increase in depth and width. The soil being very erodible, it just runs down forming vertical cliffs. It has been observed that some of these gully heads advance into the good agricultural land at quite an alarming rate of 30 ft. in one season. Ravines are not only an economic problem but a social problem too. In U.P., Madhya Pradesh and Rajasthan these ravines provide hide outs to dacoits and dangerous out-laws.

2.8.3 Though no accurate survey has been conducted to assess the actual area under ravines, the estimated area is about 5 million acres of which about 7 lakhs are on the banks of Chambal in Madhya Pradesh and the rest in Uttar Pradesh and Bombay. A

survey of Ravines in the districts of Gwalior, Morena and Bhind in Madhya Pradesh indicated that about 12 percent of the total area and about 29 percent of the total cultivated area is under ravines. In seven years about 1500 acres of good fertile agricultural land in these areas were affected by the formation of ravines. It will thus be seen that the problem of erosion and soil deterioration in the affected areas is quite serious to need due consideration.

2.8.4 To prevent further encroachment of the ravines into the agricultural land above would require treatment with contour bunding or other soil conservation measures and the reclamation of the existing ravines. First part is already dealt with under agricultural land. The programme under this deals with the reclamation of ravines. Methods of reclamation will depend on whether the ravines are active or-dormant and whether they are narrow or broad. In case of active ravines the method will be afforestation, grazing control and constructions of vegetative or other types of cheaper chutes for safe disposal of water from the cliff. In the case of dead or-dormant ravines, the low basins which are sufficiently wide for formation of sizeable plots for cultivation can be developed for raising economic agricultural and horticultural crops. These areas will have to be given adequate protection against soil erosion by bunds, check dams and other structures and afforestation of the ravine cliffs. Other methods include plugging the mouths of ravines at suitable points by either earthen or masonry plugs with surplusing arrangements. Cost for afforestation may be about Rs. 50-75/- per acre. Other soil conservation measures like check dams construction of other mechanical structures may cost about Rs. 120-150/- per acre although in a few cases the cost may be about Rs. 400/-. Average cost may work out to Rs. 100/- per acre.

2.8.5 Economic and social benefits more particularly the latter are difficult to assess. Reclamation of ravines would check further deterioration of fertile agricultural land.

Besides it would increase the fodder and fuel resources of these areas which will save cow-dung for use as manure to restore the lost productivity of agricultural land. Every one million protected would provide employment potential equivalent to 30 million man days.

● PROBLEM OF RECLAMATION (Saline and Alkaline Lands)

2.9.1 Large areas of fertile agricultural land have gone unproductive or become less productive for reasons like

- (1) Infestation with obnoxious weeds e.g. Kana.
- (2) Rise in Sub-Soil Water Level and the resultant conditions of water logging and saline and alkaline soils.
- (3) Deterioration of fallow and other uncultivated land adjoining cultivated fields through soil erosion.

Reclamation and proper land use planning of these lands will have great production potential.

2.9.2 In a rapid survey of the Kans infested areas conducted sometime back it was estimated that there were nearly 12 million acres infested with kans in the erstwhile States of Central Provinces, Bhopal, Madhya Bharat, Uttar Pradesh and Vindhya Pradesh. These areas were considered to be capable of reclamation only by heavy tractors. This area was under the plow some 20-30 years ago but was rendered uncultivable due to the rapid encroachment of kans. Reclamation of kans infested areas are dealt with by the Land Reclamation Section of the Ministry. The Central Soil Conservation Board concerns with the reclamation of land affected by water logging and formation of saline and alkaline soils and protection to fallow and other uncultivated land from deterioration through soil erosion.

2.9.3 Large areas in the irrigated tracts have gone out of production or have been rendered less productive due to rise in sub-soil water level and consequent development of saline and alkaline soils. It is estimated that there are about 10 million acres of such lands. Out of these about 3 million acres lie in Punjab, 2 million acres in Uttar Pradesh and one million acres each in Bombay and Madhya Pradesh and the rest scattered in Madras, Andhra Pradesh, Orissa and other States. Every year nearly about 50,000 acres of fertile agricultural land are probably going out of cultivation in areas of rising water table in Punjab alone. This is

caused by seepage from canals, and water channels and in large part by unwise and excessive use of irrigation water. In fact, high water tables have caused trouble in almost every one of the world's irrigation Projects. The hazards for soil deterioration on this account is likely to increase with the increasing potential for irrigation. One thing of course that needs to be stressed in this behalf, particularly for future plans, is the provision of drainage before but not after the land goes out of production. Considering the importance of this problem the Indian Council of Agricultural Research has considered it vital to make provision for establishment of three salinity laboratories during the Third Five Year Plan for fundamental and applied investigation of the problem. Almost all the lands in irrigated areas lie in the arid zone. They are inherently rich in soil fertility, and are high in production potential. Given a chance to reclaim these lands will considerably add to the agricultural production of the country.

29.4 Saline and alkaline soils occur in varying stages of deterioration. These may be described as follows:

(1) Soils that are high in soluble sodium salts but they also contain large proportion of calcium and magnesium. These soils are usually quite permeable unless of very fine texture.

(2) Soils in which sodium exists in adsorbed (exchangeable) form. These soils are characterised by poor permeability, deficient calcium and magnesium.

(3) Soils of the type mentioned under category 2 above; but underlain by impermeable clay-pans or hard pans.

Reclamation of these soils necessitates different methods e.g. Agronomical, Mechanical and Chemical.

29.5 The main reason for these lands going unproductive is the rise of sub-soil water level. The basic thing therefore is to provide proper drainage. It may be open or underground drains. Water table may also be lowered by pumping water from tubewells and back in to canals. However, this has not

been found effective so far since the quantity of water so pumped out from the land is not able to keep down the water level sufficiently low all the time during the growing period of the crop. More effective methods such as collecting the underground drainage of the fields at a suitable place and pumping the water either back into the irrigation channels or nallas and rivers by suitable pumps shall have to be tried to maintain the water level at the desired depth.

2.9.6 The farms have to be provided with either open or tile or masonry rubble drains which should out fall into a suitably located main drain or pond. Generally it is estimated that such drainage works would cost about Rs. 100 per acre. Such works can be undertaken on a watershed basis with suitable assistance to farmers. Actual reclamation of saline or alkaline soils will need mechanical chemical and agricultural methods. For the saline soils of type under category I above leaching of salts may be quite sufficient. The reclamation of category 2 soils will be more difficult. Methods required would be:-

Chemical treatments e.g. (i) application of organic manure like Farm Yard Manure and Compost, (ii) Calcereous amendments such as gypsum, press mud etc. (iii) application of green manures (iv) incorporation of straw begasse, dry stubbles etc. and (v) soil conditioners.

2.9.7 These methods would be combined with mechanical treatments like constructing compartmental bunds, contour plowing and mulching. Agronomic practices would include growing of salt resistant crops like or other plants.

2.9.8 Reclamation of category 3 soils is more difficult. Ripping to break the hard pan combined with other chemical, mechanical and agricultural methods including growing deep

rooted salt resistant crops may be successful. The cost for reclamation per acre by various methods may vary from Rs. 1 to Rs. 250/-. The over all cost for reclamation is taken at about Rs. 200/- per acre.

2.9.9. Before actual reclamation work of saline & alkaline soils is taken up, it is essential to have a survey of such areas. It is proposed that during the Second Plan period survey of these areas would be taken up under All India Soil Survey and Land Use Planning.

2.9.10 Water logged and saline and alkaline lands produce practically nothing at present except a little grass. Though these lands may not produce bumper crop in the first year of reclamation, there will be a gradual increase in production and it is expected to reach the peak by the end of the third year. Out of the present 10 million acres under this class of land about 2/3rd the area or 7 million acres may be such as could be reclaimed by leaching of salts and drainage. The average increase in production from these lands would be of the order of 2-2.5 million tons.

10 RECLAMATION OF OTHER WASTE LAND
(Fallow and uncultivated land)

2.10.1 Areas included under this class are those which are lying fallow and other lands which are not put under cultivation for various reasons for instance they may need some reclamation, the place may not be healthy, the areas may be badly affected by erosion, or obnoxious weeds etc. The most of these areas form pasture land, village groves and common grass lands. These lands are generally neglected. Pastures and grass lands are over-grazed. Trees growing are cut indiscriminately without any provision to plant any more trees. All these practices simply hasten the rate of deterioration of these lands.

2.10.2 Total area falling under this category is about 105 million acres. At least 50 million acres would need intensive soil conservation measures. Out of these 50 million acres, about 12 millions are lands affected, about 10 millions are saline and alkaline soils. This leaves 23 million acres under this category that needs to be protected.

3.10.3 Having been neglected for decades these lands are so badly eroded that arable farming is hardly possible. These areas when reclaimed properly by soil conservation methods, will provide a great potential source for fodder and fuel. Some of these lands should be afforested to supply fuel and fodder and the rest put under improved pastures. Rehabilitation of highly undulating and badly eroded areas would also need some engineering structures. The average cost for reclamation of these lands may be about Rs. 70/- per acre.

3.10.4 Reclamation of these waste lands by afforestation and grassland and pasture development would increase quite appreciably the fodder and fuel resources of the concerned areas. This will also help in saving cow-dung for use in the fields to restore the lost fertility. Development of pastures over 23 million acres would provide enough grass to maintain about 7 million heads of cattle or its equivalent at near production level all the year round.

11 CONSTRUCTION OF PERCOLATION TANKS

2.11.1 Ground water is an important source of water for agriculture as it usually results from deep percolation of water into the sub-soil. It has been estimated that in the U.S.A. the total usable ground water in storage is of the order of 10 year's annual rainfall. In this country irrigation started with the use of ground water by digging wells before irrigation from surface water was introduced. Loss of rain water by run off deprives the sub-soil streams and springs of their source of replenishment and the water level in the wells goes down.

Such underground resources and springs go partially dry in the non-rainy season leading to drought conditions and thus adding to the hazard of successful crop production in such areas. The problem of ground water is more important in scarcity areas where low rainfall and serious hazard of erosion add to the problem.

2.11.2 One of the ways to augment or recharge this underground storage is to increase the amount of water entering the soil. Impounding water in a series of small basins formed by small earthen bunds helps deep percolation and recharge of ground water. Such basins are called percolation tanks. In this country there are many places where such basins are constructed. Under these tanks wells would develop or where such well irrigation has spread and there is a fall in the water table, such tanks, recharge the underground reservoir. These works would increase the area under irrigation and therefore the food production. These tanks are constructed in places where the ground surface is irregular and gullied so that the bund prevents the water collected in the gullies from running off before it has a chance to penetrate into the soil. Such tanks need a small catchment preferably rocky so as to collect clear water lest silty water should seal off the ground pores. The water spread would wet a greater area and induce percolation. These percolation tanks would be cheaper than irrigation tanks as (i) evaporation loss is obviated (ii) the

responsibility and expenditure for bringing into use the
11
irrigation water is absent as the interested owners would dig
new wells or deepen the old ones. This method is certainly
a water conservation method. Usually the construction cost
for tanks may work out to Rs. 300/- per acre of the area
commanded by irrigation. The increase in yield by irrigation
in these areas may be expected about 0.16 tons per acre.

C H A P T E R I I I .

1 P R O G R E S S O F S O I L C O N S E R V A T I O N .

Progress of Soil Conservation and Dry Farming Work prior to the First Five Year Plan.

3.1.1:- The problem of soil conservation is as old as the agriculture itself. However, it is only in the recent years that there has been growing awareness of the problem. Early research work consisted of dry farming and soil conservation in scarcity areas. ^{and also to develop techniques for study of erosion and soil deterioration} This has high-lighted the seriousness of the problem and work was also done in afforestation and contour bunding to check hill side erosion in the Punjab. Although the first systematic and scientific approach to dry farming was made in 1923 at Manjri (Bombay), the planned programme was initiated not until 1933, when I.C.A.R. sanctioned scheme for dry farming research in Bombay. The work in Madras was started at Hagari near Bellary from 1934 and in the former Hyderabad State at Raichur, also in the same year. The Punjab scheme was carried out at Rohtak from 1935.

3.1.2:- Early work in extension of soil conservation measures was not much. However, among the States, Bombay, Punjab, Madras, Uttar Pradesh and former Hyderabad State deserve mention. Total area covered by soil conservation measures prior to the First Five Year Plan would be about one to one and half million acres only. At no time any concerted effort, however, was made to tackle the problem on all India basis.

3.1.3:- The vastness and seriousness of the problem of soil deterioration through erosion and its All India nature was well appreciated by the Planning Commission, in the First Five Year Plan. It was remarked, "Large areas in the country have been rendered useless as a result of soil erosion and still larger areas have been partially affected and their productivity reduced. Sheet erosion, which consists of the washing away of the fertile top layers of the soil, is most widely prevalent and causes enormous losses every year. Gully erosion which generally follows in the wake of sheet erosion, is steadily on the increase. Along the margin of the Rajasthan Desert erosion also results from wind action and the over-laying of arable lands by desert sands." Planning Commission also appreciated the need for survey, research and demonstration. Besides it was also considered necessary that the States should enact legislation giving them powers.

1. To effect improvements in the farmers' fields and to divide the costs between them and the State;
2. To constitute farmers' co-operative associations; and
3. To declare certain areas, "Protection Areas" and restrict certain practices in them so that much larger areas may be protected against erosion, floods, silting and desiccation.

The Planning Commission recommended setting up a Central body to tackle the problem on all India basis.

3.1.4:- In pursuance to the recommendation Central Soil Conservation Board was set up in September, 1953 with the following functions:-

- /and
1. to organize, co-ordinate, and initiate research in soil conservation on various types of land put to different kinds of land-use such as, agriculture, forestry/grazing etc.;
 2. to assist States and River Valley Projects;
 - (a) in drawing up their schemes of soil conservation;
 - (b) in the enactment of legislation required for the purpose; and
 - (c) by tendering such technical advice as may be required from time to time;
 3. to act as a clearing house of information on soil conservation and as store house of experience gained in various parts of the country. It will organize publicity and arouse public consciousness against misuse of land;
 4. to arrange for the training of technical personnel of the upper as well as the lower grades required to implement soil conservation schemes;
 5. to provide such assistance as may be required in carrying out reconnaissance or detailed surveys in accordance with the standards laid down for the sake of uniformity throughout the country;
 6. to recommend financial assistance for schemes of States and River Valley Projects on an approved basis. This would include research, demonstration and extension;
 7. to co-ordinate inter-State Soil Conservation Projects; and
 8. to undertake such cognate measures as are germane and relevant to the pursuance of the aims and objects of the Board.

3.1.5:- Following are the basis of Financial Assistance:-

(A) GRANTS:- Grants otherwise known as subsidies will be given by the Government of India (Central Soil Conservation Board) to the State Governments in order to meet a portion of the net expenditure on the scheme of soil conservation. The State Governments would be expected to meet the major portion of the expenditure on Soil Conservation Schemes.

3.1.6:- The quantum of assistance would depend on the merits of each case. As the Soil Conservation measures are still in the experimental state, it would not be possible to determine in advance the extent to which a particular scheme could qualify for assistance. The Central Soil Conservation Board has, however, laid down the following principles for affording financial assistance to State Governments and other authorities:-

1. The total subsidy in respect of a particular scheme should not exceed 25% of the total cost of the scheme, the Board's

share of the subsidy being limited to 50% thereof, equal amount being borne by the State Government. The latter would of course be at liberty to allow higher subsidy at their own cost.

2. The pattern adopted for the scheme under G.M.F. may be followed by the Board in the proposals where a higher percentage of subsidy than 50% as provided in the preceding para is called for on the justification of the financial position of the State.
3. Nominal subsidy to induce the authorities may be given for Soil Conservation Schemes of waste land forming part of a catchment or sub-catchment to meet expenditure on afforestation as a special case.
4. In case of schemes of afforestation subsidy upto 50% can be given by the Board depending upon their remunerative character. Following ceiling rates have been fixed for purpose of subsidy in afforestation work:-

(1) Hills.	Rs. 45/- per acre.
(2) Sub-mountain area.	Rs. 55/- per acres.
(3) North India Plains.	Rs. 40/- per acre.
(4) Deccan.	Rs. 35/- per acre.
(5) Tropical Wet Areas.	Rs. 35/- per acre.
(6) Arid Zones.	Rs. 35/- per acre.

5. Subsidy upto 100% can be given in respect of works part of the expenditure including work charged establishment on pilot or demonstration schemes. This will also apply to demonstration schemes in River Valley Project areas.

The demonstration Schemes on Dry Farming would be eligible to the grant of subsidy of 50% of the cost of works and work-charged staff.

6. Soil Conservation Research of local problems Survey & Planning by the State Government will be eligible for subsidy from the Board equivalent to $\frac{1}{2}$ of the approved expenditure i.e. on 50:50 basis, provided the scheme is run on a restricted basis.

In case of the expansion of the existing soil conservation scheme only the additional expenditure over the normal expenditure of the scheme will be subsidised by the Board to the extent of 50%.

The quantum of financial assistance to run Training Centres will be on 50:50 basis on the approved cost of staff, Survey & Instruments.

7. No staff other than work charged employees for Soil Conservation Schemes is eligible for Central subsidy.
8. Soil Conservation Schemes in the tribal areas will be subsidised to the extent of 75% and 25% cost will be met by the State concerned.
9. Subsidy to the extent of 50% of the cost on staff exclusively employed on Desert Reclamation can be given by the Board.

3.1.6:- (B) LOAN:

1. Loan may be given to meet the entire expenditure on a scheme on the definite understanding that the State Government would be entirely responsible for its re-payment with interest within the stipulated period.
2. Loans would be recoverable with interest within a maximum period of 15 years.
3. Loans may be admissible to meet the cost of land or rights of pasturage required to be purchased for the desert reclamation work.

2 PROGRESS OF SOIL CONSERVATION DURING
THE FIRST FIVE YEAR PLAN.

3.2.1 All Soil Conservation Schemes are grouped under Category A & B. Category 'A' includes schemes which are executed and financed by the Central Government and these are All India Soil and Land Use Survey, Research, Demonstration and Training. Category 'B' Schemes include schemes which are run by the States and are subsidised by the Central Government. In discussing programme and progress of soil conservation, the schemes under the two categories will be dealt separately.

Category 'A' Schemes

3.2.2 During the two years of the First Five Year Plan, Five regional Soil Conservation Research Stations with two Sub-Stations (the Sub-Stations have since been made as full fledged Stations) were set up by the Board to conduct soil conservation research in the specific regional problems. The following Stations were started:-

Dehra Dun with its sub-Station at Chandigarh to deal with the problem of erosion in the Himalayas and in particular in the Siwaliks in the foot-hills of the Punjab, Pepsu, Himachal Pradesh and Uttar Pradesh.

Kotah with its sub-Station at Agra to investigate the problems of gully and ravine formations on the banks of rivers in the alluvium.

Vasad to undertake soil conservation of ravine areas in the Gujrat.

The Bellary Station was set up to undertake investigations on the soil conservation problems of the black soils (derived from granite) which affect large areas of cultivated lands in the States of Madras, Andhra, Mysore and Hyderabad.

The Station at Ootacamund was started to investigate the hill-side erosion on the Nilgiris.

The Desert Afforestation and Soil Conservation Research Station at Jodhpur was started in 1952 to investigate methods of desert control by creating vegetation and shelter

belts and to improve land use practices.

3.2.3 The Board had also initiated soil conservation training programme. Following courses were given.

1. Gazetted Officers training course for one year at Dehra Dun.
2. 3 months refresher course for Gazetted Officers at Dehra Dun.
3. Assistants training course for six months at Kotah, Bellary, Ootacamund & Hazaribagh.

By the end of the First Five Year Plan 19 Officers, 51 Assistants were trained.

Category 'B' Schemes

3.2.4 The progress of soil conservation under Category 'B' Schemes is indicated below.

STATEMENT OF PHYSICAL ACHIEVEMENTS

Period	Schemes Sanctioned	Area covered in million acres
1954-55	11	0.7
1955-56	48	

STATEMENT SHOWING UTILIZATION OF FUNDS

Period	Amount approved			Amount Utilized			%age
	Loan	Subsidy	Total	Loan	Subsidy	Total	
1954-55	27,32,375	4,36,630	31,69,005	19,00,000	40,50,000	23,50,000	74
1955-56	173,13,284	61,54,569	234,67,953	83,23,313	39,96,000	1,23,19,313	52
	2,00,45,759	65,91,199	2,66,36,958	102,23,313	44,46,000	1,46,69,313	59

3.2.5 Apart from the research Demonstration & Extension of soil conservation measures, the Central Soil Conservation Board had drawn up a model soil conservation Bill in consultation with the Ministry of Law. The Bill provides "for the preparation and execution of land improvement schemes including schemes of the conservation and improvement of soil resources, the prevention or mitigation of soil erosion, the protection of land against damage by floods or draught and the reclamation of waste land in the States. Other important provisions in the Bill are the creation of the State, Land Improvement Boards and Distt. Committees."

The State Board draws its authority from the State Government under whose directions it can prepare soil conservation and land improvement schemes in respect of any areas. The Board in turn can direct the District Committees to prepare schemes & estimates for areas in their jurisdiction and can consider and approve such schemes. The Distt. Land Improvement Committee can prepare schemes for land improvement and execute them with the co-operation of the farmers at cost or part of the cost of such works. If necessary, Distt. Land Improvement Committee can acquire waste land for improvement for a period of 10 years on payment of proper compensation. Such land after carrying out the necessary improvements, shall revert back to the owner. The responsibility for maintenance and repairs of the works, carried out under the scheme, rests with the farmer. In default, the Collector shall get the works executed or repaired and recover the cost thereof from such persons. The bill is circulated to the State Governments with the request to introduce the same in the State Legislature and enact law on the subject. In the States where Legislature was already in force it was suggested to consider the bill with amendments which were necessary on the lines of Model Bill.

3.2.6 Considering the fact that the Central Soil Conservation Board was created only by the middle of the First Five Year Plan, the achievement during the two years of its infancy in research, demonstration, training & extension can be regarded as no small achievement.

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3. PROGRAMME & ASSESSMENT OF PROGRESS FOR THE SECOND FIVE YEAR PLAN . CATEGORIES 'A' SCHEMES.

Integrated All India Soil Conservation and Land use survey.

3.3.1 The plan of the work in the Second Five Year Plan consists in carrying out reconnaissance and detailed survey in the catchment area of river valley projects, commended areas under the canals and cultivated areas. So far, reconnaissance soil survey of 34 lakh acres and detailed soil surveys in catchment area of about 40,000 acres have been completed. During the remaining period of the Second Five Year Plan the following targets are expected to be fulfilled.

Target of detailed and reconnaissance soil surveys in the remaining Second Five Year Plan period.

Type of the area	Detailed Survey (16" or 8" = 1 mile)	Reconnaissance Soil Survey (1" = 1 mile)	Total
Non-Catchment	3200000-acres 5000-sq. miles	2500000-acres 3900 -sq. ml.	5700000-acres 8900 -sq. ml.
Catchment	3000000-acres 4700-sq. ml.	9000000-acres 100 -sq. ml.	12000000-acres 18700-sq. ml.
Total	6200000-acres 9700-sq. ml.	11500000-acres 17900-sq. ml.	17700000-acres 27600-sq. ml.
Area surveyed during the Second Five Year Plan upto now.	4000-acres	3400000-acres 5300 -sq. ml.	3440000-acres 5362-sq. ml.
Grant Total for Second Five Year Plan.	6240000-acres 9762-sq. ml.	14900000-acres 23200-sq. ml.	21140000-acres 32962-sq. ml.

3.3.2 There is dearth of trained personnel in soil survey. Dr. C.E.Kellogg in his report has greatly stressed for the continued emphasis to training both within the country and also in foreign countries. It is proposed that training in soil survey will be initiated during the remaining period of the Second Five Year Plan.

3.3.3 The Research Stations at Dehra Dun, Kotah, Bellary, Ooty Vasad, Agra, Chandigarh and Jodhpur started during the First Five Year Plan will be continued for the Second Plan period. Besides the above Research-cum-Demonstration Centres the Central Soil Conservation Board have also started (a) Research Cum-Demonstration-centre at a Chhatra to investigate into the soil conservation problems of catchment of Kosi river and (b) the extension scheme called "Development Scheme for Reclamation and Control of Rajasthan Desert" running in Rajasthan. During the remaining period of the Second Plan a combined Research-cum-Demonstration Station for red and laterite soils will also be established.

3.3.4 Apart from the above Centres an ^{arid} Zone Research Station is proposed to be established during the Second Plan period for investigating the fundamental aspects of desert problems. This Station will be partly subsidised by UNESCO. The objectives of the Arid Zone Research Station are the fundamental studies on the following aspects of the desert land.

1. Biology (Botany and Zoology)
2. Animal Husbandry (animal genetics ^{Animal nutrition} and breeding)
3. Desert Pedology.

3.3.5 Inspite of the early handicaps of staff, buildings and equipment in establishing the stations, fairly good progress in research work has been made at all the Centres with encouraging results besides for all the Station Research Programmes have been finalised.

3.3.6 As regards training facilities, the Central Soil Conservation Board had opened one Training Centre for Officers at Dehra Dun and 4 training Centre for Assistants at Kotah, Ballary, Ootacamund and Hazaribagh during First Five Year Plan. For Sub-Assistants training, States have their own Centres. These Centres will continue with increased tempo of training.

3.3.7 The requirement of trained Officers for the Second Five Year Plan was estimated at 200. By May, 1958 there were about 100 trained Officers (including 47 available at the commencement of the Plan) Thus 100 more trained Officers would be required by the end of 1960 to achieve the target (Officers trained in 1960-61 will be available in 1961-62). So far the admissions at Dehra Dun were limited to 20, however, to cope up with the targetted figures for training the number of admissions can be increased.

3.3.8 The requirement of trained Assistants for the Second Plan period was placed at 1,000. Number trained till February, 1958 was 470 including (170 available at the commencement of the Plan). The balance of 530 trained Assistants required is proposed to be made up by enlarging the present carrying capacity of the four Centres from 80 per session or 160 per year to 140 per session or 280 per year.

3.3.9 Training of Sub-Assistants is to be carried out by the State Governments. There were 10 Centres and 15 more were recommended to be opened. It is expected that the States would strive to achieve the required target.

3.3.10 At present, many of the State Governments have not availed of fully the training facilities offered by the Central Government. Government of India have offered to State an allowance of Rs. 75/ per Assistant to cover part of the training expenses, so as to enable the State Governments to send more men for training. Besides, private candidates are also encouraged to join training at their own cost provided they are sponsored by the States. Further the Agricultural personnel committee appointed by the Government of India have recommended that soil conservation as a subject in the Agricultural and Forest Institutes should be started from the Third Five Year Plan.

3.3.11 The Central provision on Soil Conservation

under category 'A' Schemes for the Second Plan is as under:-

	Rs. in lakhs.
1. Soil Conservation Survey and Planning.	77
2. Pasture Development Scheme.	115
3. Research Demonstration and Training.	173
	365

PROGRAM AND PROGRESS UNDER CATEGORY 'B' SCHEMES

3.3.12. For the second Five Year Plan an integrated programme of Survey, Research, Training and Extension in the States, with priority for agricultural land was drawn up. The proposed target for each category of schemes with the progress made during the first two years of the Plan upto 1958 is indicated in the table 1 attached.

3.3.13. Progress of soil conservation in the agricultural land is generally fair in many States except in U.P. Andhra Pradesh, Madras and Madhya Pradesh. The progress in River Valley Projects is not satisfactory. In the schemes concerning Desert, Hilly areas and waste lands the progress is satisfactory except in case of Bombay, Himachal Pradesh and Delhi.

3.3.14. During the second Plan period the programme envisaged carrying out of soil conservation work in a phased manner, viz., during the first two years it was 10 per cent of the programme, in the third year it is 20 per cent, and in the last two years it will be 30 per cent of the whole programme. Judging from the achievement, per cent progress in agricultural land is satisfactory although the over-all progress is only about 49 per cent. In this connection it would be relevant to mention that during the two years of the Plan period it was not possible to have better results as in many States there was no suitable organisation for carrying out soil conservation work. Further in many of the States no soil conservation Act has been passed. Present position with regard to organisational set up in States is indicated in Appendix 1. The third difficulty was due to re-organization of the States. Apart from the above in good many cases there were delays on the part of the States for administrative sanctions for schemes. This

was partly likely as for any new programme. However, there is no need to be pessimistic over the past progress, it is expected that during the period of the Second Plan we would be able to achieve at least 70-80 per cent of the target.

C H A P T E R IV
Proposed programme for Third Five Year Plan.

4.1 In the third and the subsequent Five Year Plans increased tempo on survey, Research, Demonstration Training and extension of soil conservation measures on land are envisaged. In view of the urgency to solve the food problem in the shortest possible time great emphasis is placed on soil conservation measures in the agricultural land. It is proposed to phase the programme on agricultural land to cover 100 million acres of the problem area by the end of sixth Five Year Plan as follows:-

By the end of Second Plan.	3.3.	million acres
Third Plan	6.7	-do-
Fourth Plan	20.0	-do-
Fifth Plan	30.0	-do -
Sixth	40.0	-do-
	100.0	

Categories 'A' Schemes.

4.2 By the end of the Second Five Year Plan detailed and reconnaissance soil survey is expected to be completed over about 19000 sq. miles from out of 78000 sq.mls. of the catchment areas of the six river valley projects. Thus in the survey of the six river valley projects alone there is a gap of 59000 sq. miles. Survey work will further have to be extended to other Catchments and problem areas as well. Such an essential ambitious programme cannot be fulfilled in short plan periods. It has to be a long range programme phased on priority considerations. It is therefore necessary to extend the scheme in the Third Five Year Plan Period and also into the Fourth Five Year Plan periods to complete the work already in hand. For successful implementation of the programme qualified and experienced staff have to be employed. In the interests of increased efficiency the workers in the scheme should be given security of service, and therefore the whole set up should be kept on a permanent footing.

4.3 Keeping in view the requirements of the country as a whole, the programme for successful plan periods has to be drawn up and operated jointly by the Centre and the States according to the standard of All India Plan. The States will concern themselves with immediate problem areas on the standard pattern and procedure laid out on All India basis. The work will be as a part of All India Soil and Land Use Survey scheme and will be under the close scrutiny of the Chief Survey Officer of the Central Soil Conservation Board.

4.4 During the Third to Fifth Five Year Plan the target of detailed and reconnaissance soil survey (with the proposed expanded staff proposed) is as follows:-

TABLE II

Type of area	Total area to be surveyed in detail (16" or 8" = 1 mile)		Reconnaissance Soil Survey (1" = 1 mile)		Total	
	Sq. ml.	Acres in thousand)	Sq. Ml.	Acres in thousands)	Sq. Mile	Acres in thousands.
Non Catchment	9.375	6,000	9,375	6,000	18,750	12,000
Catchment	12,500	8,000	37,500	24,000	50,000	32,000
3rd Plan.	21,875	14,000	46,875	30,000	68,750	44,000
4th Plan	21,875	14,000	46,875	68,750	68,750	44,000
5th Plan	21,875	14,000	46,875	30,000	68,750	44,000
Grand Total:	65625	42,000	140,625	90,000	206250	132,000

4.5 Thus the total area to be survey in the Second to Fifth Year Plans (1956 to 1975) will be 15340000 acres or 2,39,212 square miles).

3.4.6 To enable the field staff to carry out the project efficiently and at a faster rate it is considered necessary to strengthen the staff as follows

Geomorphologist for the Headquarters and Assistant Geomorphologist one for each regional centre for preparation of detailed maps.

Soil Survey Interpreter for the Headquarters and Assistant Interpreters one for each Regional Centre to interpret standard soil maps of a particular area for different purposes. Assistant Soil Correlator, one for each of the Regional Centre to work in association with the Soil Survey Chief of each of the States for developing standard legends, nomenclature and classification of soils.

Farm Plan officer for Headquarter and Assistant Farm Plan Adviser one for each centre to keep a liaison between the extension staff of the centre, the States and the Soil Survey Organisation.

4.7 It may be mentioned here that Dr. C.E. Kellogg in his report had recommended specially the creation of the post of Geomorphologist and creation of the Section of Soil Survey Interpretation in the Organisation.

4.8 In addition to the above there is need for Assistant Soil Conservation Officer and a Chemist for Bangalore. During the Third Five Year Plan there would be need to strengthen the staff for cartographic laboratory at Headquarters besides other administrative staff to relieve the scientific staff from administrative work. It is also considered necessary to strengthen the Soil Survey field parties at Bangalore of which there are only 5 with five Soil Survey Assistants as against 15 Soil Survey Assistants with 15 field parties at Delhi (Alluvial region), Nagpur (Black soil region and Calcutta (Red and Laterite Soil region. The work for Bangalore region will increase as they will have to work on watershed areas in Southern India.

4.9 It is also considered necessary to set Regional Cartographical Laboratories during the Third Five Year

Plan to meet the expanding work.

4.10 The three post of soil conservation officers for Head Quarter will be kept in abeyance for the present as per the recommendation of Dr.C.E. Kellogg and also

3.4.11 During the Third Five Year Plan the ten Research cum Demonstration centres (including the one for red and laterite soils) will continue. The Arid Zone Research Station partly aided by UNESCO will continue its activities during the Third Plan period. The Development Scheme for reclamation and control of Rajasthan Desert is proposed to be handed over to the Rajasthan Government at the end of the Second Plan period.

4.12 "The greatest asset of a nation is its store house of scientific knowledge and technical skill. Unlike material resources, which get depleted with use, this resource grows on the use and is enlarged by sharing". Research like planning is a continuous process. In the next twenty years or so we may be able to extend soil conservation measures over two million acres of the problem areas in the Agriculture land. Besides we may also be able to protect many million acres in the Catchments of River Valley projects, water sheds of flood schemes, the Desert, Hilly areas, Ravines and other waste lands etc. But, this is no final answer to all the evils of soil erosion and land deterioration. Soil conservation in its meaning of the word, constitutes" using each acre of agricultural land for the purpose for which it is best suited and treating it in accordance with its needs for protection and improvement". Thus it is a programme of land use planning for each acre of land. Only a strong a permanent Research set up can find answer for proper land use planning under such a variety of

soil, climate, social and economic conditions. We have to appreciate that the Research Stations do not have a limited mission to reclaim the area of the Research Station and roundabout which can be over in 15-20 years time. Their mission is really unlimited. A permanent set up of Research is essential for conservation of soil which is the basic resource of the nation.

4.13 Demonstration projects are essential aspects of developing awareness and appreciation of soil conservation methods and their values. Recently the Standing Committee at its meeting took a decision that demonstration projects should be taken up by every Research Centre. During the Third and Subsequent Plans the type and number of Demonstration projects would increase.

4.14 The requirement of trained personnel for soil conservation work during the Third Plan would be influenced by the machinery that will be built up at the end of the Second Plan and the target for the Third Plan. If the Training programme initiated during the Second Plan is geared up and the training Centres complete the programme as envisaged, the personnel built up during the Second Plan period would be able to undertake soil conservation work during the Third Plan, over an area of 6.25 million. During the Third Plan period, training facilities will be progressively increased to train additional 340 officers, and proportionately, Assistants trained would be 1700 and sub-Assistants 6800 as given below.

Plan period	Officers reqd to be trained	Area proposed to be covered with the staff (in million acres)
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At the beginning of the 3rd plan	available	250	250x5000x5	=	6.25
1961-62	50	50x5000x4	=	1.00	
1962-63	60	60x5000x3	=	0.90	
1963-64	70	70x5000x2	=	0.70	
1964-65	80	80x5000x2	=	0.40	
1954-66	80	(These will be available for the next Plan period)			

TOTAL..590

9.25

3.4.15 The additional staff would be able to cover an area of 3.0 million acres which would mean a total of 9.25 million acres for the Third Plan period.

3.4.16 The increased training load envisaged in the Third Plan period would necessitate the starting of more training centres and strengthening the present centres. Some additional staff and equipment would be needed for the training programme.

3.4.17 Taking all the above points into consideration the provision for category 'A' Schemes for the Third Plan would be as follows:-

	Rs. in lakhs.
Soil and Land use survey	121.00
Central Desert Research Institute.	50.00
Research Demonstration and Training.	250.00
	421.00

Category 'B' Schemes

3.4.18 The proposed soil conservation programme for the Third Five Year Plan under Category 'B' schemes including the potentialities for production and employment is indicated in the table attached.

3.4.19 During the Third Plan period great emphasis is placed on soil conservation and dry farming measures on agricultural land on account of the definite contribution which the adoption of dry farming practices can make towards increasing the food production and thereby to help to solve country's pressing food problem.

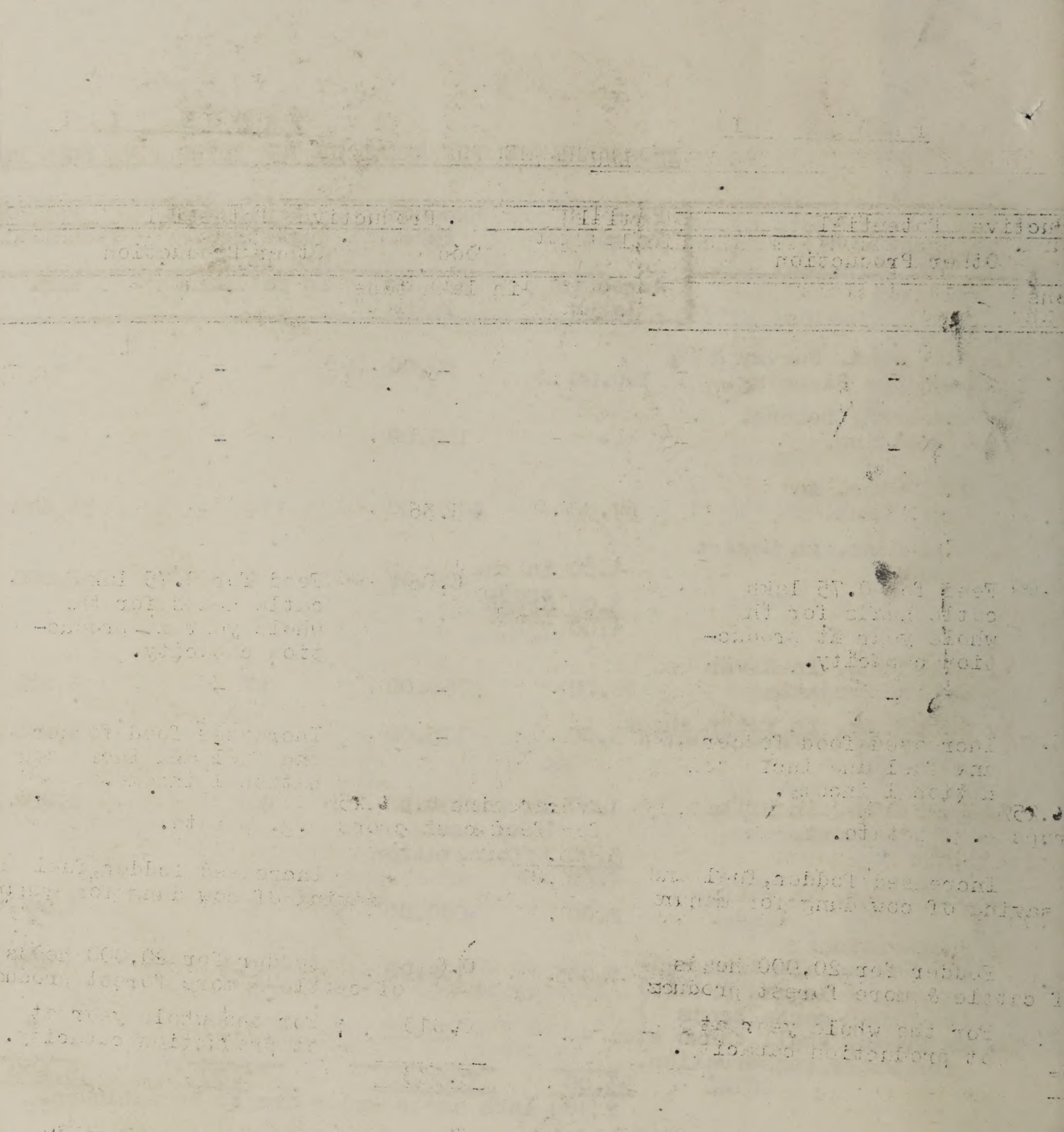
3.4.20 Early in 1957, Central Soil Conservation Board had prepared a Demonstration Scheme on Dry Farming. This scheme was prominently brought in the Agricultural Minister's Conference at Srinagar in October, 1957 and foodgrains Enquiry Committee. The Conference of Agricultural Ministers had recommended to State Governments to take up Pilot Demonstration Projects on 10 acre plots for dry farming methods. Further the Central Soil Conservation Board had also informed the State Governments that the subsidy to the extent of 50 percent would be given in respect of Dry Farming Schemes.

3.4.21 Assessment of the progress of soil conservation during the Second Five Year Plan indicated that the major bottleneck was lack of proper organisation. For proper execution of soil conservation schemes the Central Soil Conservation Board has recommended the State Governments to create a separate organisation as it will not be possible for the existing agricultural or forestry staff in the concerned departments who have to look after demonstration and distribution of improved seeds, the use of fertilizers and improved implements and pest control etc. to do justice to soil conservation work. Execution of soil conservation works need survey, planning and execution which is a full time job, and requires specially trained men. Some of the States have already created a suitable organisation as is indicated

PROGRAMME AND POTENTIAL OF THE THIRD FIVE YEAR PLAN

Item	Plan Target	Expenditure.	Employment		Potential	Productive Potential	
			Unskilled Man Days.	Technical		Food	Other Production
	Acres in lakhs	Rs. in lakhs	in millions	Nos.		in lakh tons	
1. Soil Cons. Survey & Land Use Planning.	* 100.00	50.00	-	-	-	-	-
2. Research, Demons. & Training.	-	100.00	-	-	-	-	-
3. Soil Cons. in Agri. Land.	67.00	4020.00	134	34,840	5.36		
4. Soil Cons. in Desert Areas.	1.00 in the 3.00 crop 4.00 grass land.	400.00	4	2,080	0.08		Feed for 0.75 lakh cattle heads for the whole year at production capacity.
5. Soil Cons. in River Valley Projects	10.00	750.00	30	5,200	-	-	
6. Soil Cons. in Water sheds or flood control schemes	5.00	375.00	10	3,000	-		Increased food fodder and fuel and increased national income.
7. Soil Cons. in Hilly regions.	1.00 in the 3.00 crop land. 4.00 Afforestation	600.00	80	2,080	Average increase 25% for food cash crops e.g. potato.		
8. Soil Cons. in ravine lands.	2.00	200.00	6	1,000			Increased fodder, fuel and saving of cow dung for manure
9. Reclamation: (a) Saline, alkaline and water logged areas.)	1.00	100.00	2.5	420	0.08		Fodder for 20,000 heads of cattle & more forest products
(b) Other waste lands		25.00	1.25	-	0.013		For the whole year at at production capacity.
10. Ponds, small tanks etc. for water conservation.	-						
TOTAL	93.00	7260.00	27.30	48,620	5.533		

* 100 lakh acres under are to be excluded.



in the appendix (1) - Many States however are still lacking. To help the States in setting up proper organisation it is proposed to help smaller States in financial out-lay on a declining basis. In the first year, 100 percent subsidy would be given. This will be reduced by 25 percent per year in the subsequent years till in the fifth year the States will come to bear all the expenses for the staff. The following organisation is suggested.

3.4.22 The Soil Conservation work in the States would be in charge of the Joint Director of Agriculture. There shall be a Divisional Soil Conservation Officer in charge of each division. He shall have sub-divisional ^{Officer} who shall be in charge of a district or districts or even a group of a few taluks according to the intensity of work. Under the Sub-divisional Officer there will be an Agricultural Officer one per taluk or a few taluks depending on work and there shall be Agricultural Assistant ^{State} in charge of each work centre or centres. The/ shall also have a Soil Conservation Engineer.

3.4.23 For a well organised soil conservation set up in the States, supporting staff at the Centre is also essential. It has to be appreciated that soil conservation is not merely putting a bund here or a bund there or plugging a gully head or putting a spill-way. It is not merely to plant some trees or grasses nor it is to follow a particular rotation or a system of strip cropping. But yet soil conservation embraces all these practices. The point to emphasize is that all these good practices work best only in combination. One good practice may be beneficial, but the advantages often pyramid when several good ones are used in the right combination. The reaction is much the same as vigour in hybrid corn. Therefore the staff at the Centre must consist of specialists in Agronomy, Engineering and Forestry. The work of Head Quarter staff consists of

1. Screening soil conservation proposals received from States.
2. Giving technical advice to States in preparing their soil conservation plans.

3. Scrutinizing the progress.
4. Checking works to see that are carried out according to specifications and are upto the standard.

Besides the staff also advises, suggests and helps soil Conservation Research, Demonstration and Training Centres in preparation of research programmes and also inspects the progress work from time to time.

3.4.24 Dr. C.E. Kellogg who visited this country to advise on soil survey and soil conservation had strongly recommended for inspection of soil conservation works.

" It is recommended that the Centre arrange to inspect all soil conservation work done by the Centre or under grants of funds to the States in order (i) to see that the work done conforms to reasonable standards (ii) that the most improved methods based on adequate soil surveys are followed (iii) that the soil conservation is carried on cooperatively with other village programmes (iv) that villagers are given full understanding of the work and of their responsibility in it and (v) that new and improved methods developed in the various States are rapidly spread to all other areas in India where they apply. Perhaps qualified soil conservationists of the Centre may be at regional locations for such inspections, but no administrative " layer " should be developed between the States and the Centre".

3.4.25 At present it has not been possible for the existing staff at the Central Government to inspect the soil conservation works executed by States in any great details. Since Central Government is advancing money for soil conservation, inspection of works is essential to see that the money is usefully spent.

3.4.26 For the inspection of soil conservation works executed by the States, it is considered necessary to have staff at five regional centres, viz. Eastern, Western, Northern, Southern and Central. The inspection staff would consist of one Dy. Director (Inspection) and one Asstt. Director (Inspection) in each region and two assistants for each State. The proposed staff is indicated in the appendix 2.

CHAPTER V

SOIL CONSERVATION AND OTHER AGRICULTURAL
DEVELOPMENTAL PLANS

1. Integration of Soil Conservation Programme with Animal Husbandry improvement and Dairy Development Schemes.

5.1.1 Agricultural development of India is not only increasing the yield of crops but also the improvement in Animal Husbandry and Dairy industry. Infact Animal Husbandry and Dairy Development are the two important links in the agricultural development of India. Cattle play a vital role in the rural economy of India. Bullocks are the main source of motive power in agricultural operation and milk is the major source of protective animal protein in the dietary of most people of this country. Dung of cattle is still the main source and probably the only-source of adding fertility to the soil in many places. If soil conservation is to be the foundation on which agricultural structure of this country is to be built then there has to be close integration between soil conservation programme and Animal Husbandry improvement and Dairy Development Schemes.

5.1.2 India claims to own over 1/4th the world's bovine population. However the milk producing capacity of Indian cow and buffalo are probably the lowest being only 366 and 364 lbs. per year respectively. The major problem of animal husbandry in India is that of too many heads, inadequate feed and too little care for the cattle. Under the present conditions the cattle are not maintained at full production level.

5.1.3 Improvement of animal husbandry is concerned with the improvement of cattle for increased productivity, improvement of sheep for increased wool production and improvement of other live-stock. Dairy Development generally envisages the rehabilitation of dairy industry by improving marketing conditions. While improvement of animal husbandry provides the basis for dairy development, the latter provides the incentive for improvement of cattle by providing remunerative outlets for dairy and animal husbandry products.

5.1.3 It is estimated that 30 percent of the bullock power efficiency and 50 percent of the productive capacity of cows and buffaloes could be increased by scientific methods of feeding alone. At the present level of production in the country available quantities of concentrates and roughages as cattle feed are 13.76 million and 768 million tons as against the present requirement of 40.28 million and 932 million tons respectively. Thus there is a wide gap between the production of feed and the actual requirement. This gap will further widen with the improvement of the cattle by breeding and elimination of diseases. How the cattle can be maintained at productive capacity if there is no increased production of fodder from agricultural land and grass from pastures and forests. Basically therefore the improvement of Animal Husbandry and Dairy Development depends on the protection of soil for the increased production of fodder on sustained basis.

5.1.4 From animal husbandry point of view important areas lie in the dry rain-fed tracts, where the hazard of erosion and soil deterioration are also the most. Soil and water conservation of these areas are the major problems for increased production of food and fodder. Village pastures and grazing lands which include fallow and other uncultivated lands have long been neglected and are generally in an advanced stage of deterioration through sheet, rill and gully erosion. Forest lands which are the potential grazing grounds are in the most cases over-grazed. At the present level of production their carrying capacity is very low. Live-stock population is the one chief contributory to the sickness of Indian land, expressed in severely overstocked grazing lands, forest elimination predominance of deteriorated village pastures and frequent floods.

5.1.5 At the present level of production from land we have not reached the level of productivity that the lands are capable. There is plenty of evidence that we have not yet put all the best combinations in practice in our system of farming and management of grass lands, pastures and forests. Experiments

have shown that with best combination of practices of soil management conservation and grass land/put into use on all farms, production can be increased manifold. Soil conservation and pasture improvement work by Albertson (T.C.M. Grass Land Specialist) in Saurashtra and desert reclamation work at Desert Afforestation and Soil Conservation Station at Jodhpur are clear indications.

5.1.6 From the fore-going discussions it will be seen that the success of animal husbandry and dairy development would depend on soil conservation measures. In any programme of animal husbandry and dairy development without a provision for soil conservation measure and grass land management in the concerned areas to increase the yield of fodder will be like "putting a cart before the horse."

5.1.7 The broad outline of animal husbandry development schemes in the Second Five Year Plan which are likely to be continued for Third and probably for the subsequent Plan periods are:-

- (i) Extension of key village schemes.
- (ii) Development of cattle in hilly areas.
- (iii) Improvement of sheep in Himachal Pradesh, Madhya Pradesh, Saurashtra, Bombay and Rajasthan.
- (iv) Improving the condition of migratory or nomadic breeders.
- (v) Rehabilitation of dislodged breeders in neighbouring areas where cattle breeding could be carried out as pastoral occupation.
- (vi) Rehabilitation of dislodged breeder on land.

5.1.8. Success of key village schemes will depend on the improvement of village pasture or waste lands. This will require soil conservation measures in the fallow and other uncultivated land for which provision is already made in the soil conservation plan.

5.1.9 Improvement of cattle in hilly areas will require soil conservation and better grass land management practices in hills.

5.1.10 Improvement of sheep in the areas indicated above will require soil conservation and grass land management practices in desert areas, Bombay(Saurashtra), Madhya Pradesh & Himachal Pradesh. In Gujerat and other areas where cattle breeders are

dislodged due to reduction in the grass lands consequent to increase in area under food crops, they are being settled either on the waste land or in the neighbouring forest lands. Most of the waste lands because they have been neglected for years are in deteriorated condition. they cannot produce much unless they are reclaimed by proper soil conservation practices combined with good system of dry farming. The problem of settling the dislodged breeders in the forest areas also needs careful consideration for soil conservation measures, as otherwise the over-stocking of these areas may lead to more serious problems. The problem of nomadic cattle breeders can be solved only by settling them on permanent land. This requires to educate them to the proper system of grass land management and soil and water conservation practices.

5.1.11 From the details of the programme of soil conservation already discussed, it would appear that the programme of soil conservation for the Third Five Year Plan has been prepared with due consideration to the problem of agricultural and animal husbandry development in the country. For proper coordination it is necessary that the States should be impressed that wherever animal husbandry schemes are taken up, a proper soil conservation and grass-land management schemes should be prepared and sent to Central Soil Conservation Board for approval.

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2. Agrarian reforms & Soil Conservation

5.2.1 To a large extent use of land is governed by many social and economic factors. Most immediate and realistic concern in the land is that the man who cultivate the land must make a living. Economic need is a powerful factor in determining how they use the land, a factor that usually outweighs other considerations. The economic considerations of land use are to a large extent dependent on the following considerations.

1. Relation of man and the land e.g. the size of holding.
2. Relation between man and man e.g. the tenancy relationship.
3. Consideration of land as an inexhaustible national resource.

5.2.2 A proper attitude to land use can only be developed (a) by proper land reform policy to eliminate the economic handicaps in land use e.g. consolidation of holdings and ownership of land by tillers (b) developing right attitude to land as an exhaustible resource. Land is to be regarded like a living thing - feed it right and treat it right and it grows like any living thing and produces while it is growing.

5.2.3 To protect the nations land resources the States have to appreciate the value of stepping up the pace of land reforms.

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3. Soil Conservation and Public Cooperation.

5.3.1 Agriculture as a whole is based on the activities of individuals. The land is owned and used by many men. In the democratic set up, national action to conserve the soil must be generated by these millions of land users.

5.3.2 Democracy does not give the government the right to compel for conservation movement - but it does recognise the responsibility of the government, to lead, and assist its citizens in the soil conservation, in the interest of public welfare. Appreciation of the values and benefits of soil conservation and active participation by the millions of individual cultivators can only achieve lasting benefits. India's strength lies in her 370 million people. With the people's co-operative effort even the most gigantic task of nation building/will become a reality.

5.3.3 On the agricultural land if the co-operation of the cultivators is mobilized, dry farming could be adopted on all dry lands in the problem areas. This measure will step up country's food production considerably in a very short time. Once the inertia of the cultivators is liquidated the other programmes of soil conservation e.g. contour bunding etc. could be completed well ahead of the schedule. In the desert areas, forests and ravines, people could cooperate for closure to grazing of these areas. This simple measure alone will halt fresh deterioration of land and rehabilitate the affected areas. Besides, it would provide a lot of fodder grasses and fuel for the people and thereby save dung to enrich their fields for increased agricultural production.

5.3.4 What has been said above is not a hypothetical assumption but something which is a reality. Progress achieved in soil conservation programme in the Bombay State is a clear example of what can be achieved through people's efforts. Similar methods have been successfully employed in our neighbouring countries, Japan and China to solve the national problems of these countries.

5.3.5 One of the measure accepted by the people in China was to facilitate natural regeneration by closing certain areas to grazing. It is claimed that in 1956 about 38,90,000 hectares were enclosed for natural regeneration. In the five years 1953-57, 59,10,000 hectares have been fenced off for natural regeneration. The State has popularised this method and the peasants are keen on it. The First Five Year Plan of China provides 35,50,000 hectares of timber trees. It is claimed that by the end of 1957, 51,60,000 hectares were planted. If China could do such miracles with mass support, there is no reason why India should not be able to do similar with its popular leadership. It is therefore u to the States to mobilize their organisation^{al} machinery to gear people's cooperations to the fullest extent.

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PLAN IN BRIEF

Low agricultural production from land, of food, fuel and fodder and raw material which largely comes from land and the increasing demand on land with the growing population have brought us face to face with stark facts about the deterioration of land through erosion resulting from faulty land use practices. In a country whose economy is based on agriculture, where more than 50 percent of the national income comes from land and more than 70 percent of the people live on agriculture, the future development would depend only on the preservation of the natural land resources. The future hope of prosperity and the power and strength of democracy will depend on the productivity of land. That we have misused our land is clear from historical and archaeological evidence. Large areas of land have been rendered unproductive and on many more profitable production has been difficult. Alarming rate at which soil deterioration is taking place particularly in the agricultural land is evident from research and land survey data. Without soil conservation measures, on a moderately sloping land top 7 inches could be lost in just 27 years. This is surely at the rate much faster than technological developments can make good the loss.

Major problem of soil erosion and land deterioration takes place in the following area.

1. Agriculture land where no system of conservation farming is practised, on the other hand, practices that favour erosion and soil deterioration e.g. cultivation down the slope, bare fallow, absence of legume in rotation, are freely practised. The problem is further aggravated by fragmented holdings. The major problem areas exist in the undulating areas of Deccan plateau and Malwa plateau, Himalayan and Sub-Himalayan regions of the North, Southern plateau land of Bihar and comparatively dry and undulating areas of red and laterite soils in Orissa, West Bengal. All these areas make up about 143 million acres. Out of these at least 100 million acres will need protection by intensive soil conservation measures.

2. Desert area in Rajasthan where aridity of the tract combined with the practices of overgrazing, cutting of trees and cultivating loose sands has caused serious problem of wind erosion over 50 million acres. The drifting sands of the desert pose a serious problem to the adjoining fertile agricultural lands of the Gangetic plain.

3. River Valley Projects:- Large areas in the catchments of River Valley Projects are seriously eroded and many more are exposed to serious hazards of erosion on account of the practices of overgrazing, indiscriminate exploitation of forest products and other wrong land use methods.

Run off from deteriorated catchments carries large silt load and debris which will get deposited at dam sites lowering their carrying capacity and therefore the economic and useful life of the dams. The future agricultural development that is planned on various River Valley Projects will only be a reality if the erosion hazard in the catchments is checked to prevent silting, as otherwise the future prosperity may be worse than the past condition.

4. Watersheds of flood control schemes:- Floods are indirect result of erosion taking place in the watersheds of flood streams. Country cannot put up with the average annual loss of Rs. 50 crores that occurs due to floods, besides the amount spent on rehabilitation of flood victims, the loss of human life, cattle and indirect losses to railways and other revenue earning departments.

5. Hilly Areas:- Due to pressure of population, lands which are unsuitable for cultivation without intensive soil conservation measure are brought under cultivation for growing crops. No consideration is given to soil conservation methods. Such areas exist in the hills as well as in the foot hills of the Himalayas from Punjab to Assam, in the Nilgiris and in other parts of Madras and Kerala. Such areas in addition have heavy rainfall which increases erosion hazard. Erosion hazards in the hilly

areas are fraught with serious consequences for fertile plains beyond their borders.

6. **Ravine Lands:-** Ravines were once fertile agricultural lands, which have been rendered so only because of faulty agricultural practices, overgrazing and indiscriminate cutting of trees. These ravines are progressively cutting in the adjoining fertile agricultural land at quite an alarming rate. Besides being economic problems, ravines pose a serious social problem too, as they serve hide-outs for dacoits and dangerous out-laws. The problem is serious in Bombay, Uttar Pradesh and Rajasthan, and M.P. particularly along the banks of rivers the Chambal, Sabarmati, Mahe and Yamuna. About 5 million acres are affected by ravines.

7. **Reclamation of waste lands:-** Large areas of once agriculturally fertile lands in irrigated area have gone out of cultivation due to rise of sub-soil water level and the resultant development of saline and alkaline lands. These areas largely exist in the Punjab, Uttar Pradesh, Bombay, Madhya Pradesh. Seepage from canals and channels and unwise use are the chief causes. Danger of further deterioration on this account is likely to increase with the increasing irrigation potential of the country. about 10 million acres have deteriorated on this account.

Other waste lands largely ~~consist~~ consist of fallow land and uncultivated land. These lands have been neglected and they are in an advanced stage of deterioration.

Total area under waste land reclamation would be about 25 million acres.

PONDS & SMALL TANKS:- Construction of Ponds and small tanks or earth dams across small catchments would go a long way in conserving rain water and soil loss and help in food production.

Solution for varied problems of soil conservation of the country would need proper survey, for proper understanding of the problem, research to find out methods suited for our specific problems, demonstration as a means of educating the farmer who ultimately is concerned with the execution of the work on the field

and also training, to have adequate number of technically qualified persons who can handle the programme effectively and efficiently. Till we develop our research, we can capitalise on the experience of other countries that are considerably advanced in this field e.g. U.S.A. and Australia etc.

The Central Soil Conservation Board was set up in 1953 in pursuance to the recommendations of Planning Commission, to implement the programme of work in Five Year Plans, pertaining to soil conservation. The Board has tentatively drawn up a phased programme to tackle 200 million acres as follows:-

Plan . . . Period	Target (in million acres)	Percentage of total target	Progressive total acreage (in million acres)
II 1956-61	4.50	2.25	4.5
III 1961-66	10.5	7.5	15.0
IV 1966-71	20	17.5	35.0
V 1971-76	40	37.5	75.0
VI 1976-81	60	65.5	135.0
VII 1981-86	65	100.0	200.0

FIRST FIVE YEAR PLAN

During First Five Year Plan about 7 lakh acres were protected by soil conservation methods.

SECOND FIVE YEAR PLAN

The programme of work for the Second Five Year Plan and expected achievements are given below:-

	<u>Rs. in crores</u>
Soil conservation survey & Planning	0.77
Central Desert Research Institute	1.15
Research, Demonstration, Training and Pasture Development.	1.73
	<u>3.65</u>

Since the establishment of Central Soil Conservation Board, Regional Soil Conservation Research Stations have been

established at Dehra Dun(U.P.), Chandigarh(Punjab), Kotah(Rajasthan), Agra(U.P.), Vasad(Bombay), Bellary(Mysore), Ootacamund(Madras) and Chhatra(Neptal), Jodhpur (Rajasthan). A combined Research Station for shifting cultivation and red soil is likely to be done during the remaining period of the Plan. Board has also initiated soil conservation training courses one for Officers at Dehra Dun and four for Assistants at Kotah, Bellary, Ootacamund & Hazarbagh.

Extention Scheme entitled "Development Scheme for reclamation & control of Rajasthan Desert " is also running in Rajasthan. This scheme is proposed to be handed over to the Rajasthan Government. Land Use Survey of 6 River Valley Projects is being run under "Integrated scheme for all India Soil and Land Use Survey ". This will continue for the Third Plan also. Arid Zone Research Station under the aegis of the UNESCO is proposed to be brought into operation during the Second Plan period, and will continue for the Third Plan also.

STATEMENT OF PHYSICAL ACHIEVEMENTS AND UTILIZATION OF FUNDS FOR SECOND FIVE YEAR PLAN.

Item	Plan 1956-58				Plan 1956-58			
	Target	Physical	Achievement	%age	Allotment	Financial	Expenditure	
	in lakh	Target	ment		in	incl.State		
	acres.				lakhs	Share.		
1. Soil Cons. Survey & Land use Planning.	29.40	3,94,000	1,03,230	27.5	14.70	7.84	5.023	
2. Research, Demons. & Training.	0.30	13,583	5,692	41.9	74.19	38.60	22.13	
3. Soil Cons. in Agri. Lands.	20.52	6,46,196	2,71,044	41.9	1232.22	400.28	231.62	
4. Soil Cons. in River Valley Projects.	3.22	78,192	33,121	42.3	33.80	78.53	53.52	
5. Soil Cons. in Desert Areas.	1.70	32,290	21,580	66.8	110.18	43.22	33.54	
6. Soil Cons. in Hilly regions.	1.70	14,905	8,175	54.8	338.81	45.82	15.55	
7. Soil Cons. in Ravine areas.	1.54	1,335	135	10.18	77.00	3.95	-	
8. Soil Cons. in Waste Lands.	1.03	82,112	62,051	76.8	103.00	59.81	37.49	

During the Second Plan period the programme envisaged carrying out of soil conservation work in a phased manner viz. during the first two years it was 10% of the programme, in the third year it is 20% and in the last two years it will be 30% of the whole programme. The achievements however have been much smaller. In this connection it would be relevant to mention that during the two years of the Plan period it was not possible to have better results as in many States there was no suitable organisation for carrying out soil conservation work. Further in many of the States no Soil Conservation Act has been passed. The third difficulty was due to the Reorganization of the States. However, there is no need to be pessimistic over the past progress, it is strongly anticipated that during the period of the Second Plan we would be able to achieve at least 70% of the target.

PROGRAMME & POTENTIALITIES OF THE
THIRD FIVE YEAR PLAN.

The proposed programmes for Soil Conservation
on Category 'A' Schemes (Third Five Year Plan).

Items	Expenditure (Rs. in lakhs)
1. Soil Conservation, Survey & Planning.	121.00
2. Central Desert Research Institute.	50.00
3. Research, Demonstration & Training.	250.00

APPENDIX

NO. 1

No.	Name of State	Whether legislation enacted	Whether any State Board constituted	Whether any Distt: Boards & Committees constituted	Whether any separate soil cons. section established.
1.	Andhra Pradesh	Old Madras & Telengana area are covered by separate Acts.	Yes	No	Special staff is sanctioned for each soil cons. scheme.
2.	Assam	No	-	-	-
3.	Bihar	No	No	No	Under consideration and a few staff sanctioned.
4.	Bombay	Yes. (Bombay Land Improvement Act, 1942)	-	Yes Constituted	Yes, under Jt. Dir. of Agri. (Engg).
5.	Madhya Pradesh	Yes. (M.P. Land Improvement Act just passed).	-	-	Yes, under Soil Cons. Officer in Agri. Department.
6.	Madras	Yes. (Madras Land Improvement Act, 1949)	Yes. Under the Chairmanship of Min. of Agri.	Yes. Distt: Soil Cons. Board.	Yes. Under Agriculture Department
7.	Mysore	No. (Parts of Old Bombay & Hyderabad are covered) (The Govt. is contemplating the enactment of one Act to cover the whole State)	Yes.	Yes. (In ex-Bombay State areas)	No
8.	Orissa	Yes. (Orissa Agri. Act, 1951)	-	p-	Yes. Under Dy. Dir of Agri. (Soil Cons)
9.	Punjab	Yes. (Prevention of Cho Act, 1901)	-	-	Yes. Under the State Cons. of Forests.
10.	Rajasthan	No	Yes	-	Yes. State Soil Cons. Officer.
11.	Uttar Pradesh	Yes. (U.P. Soil Cons. Act. 1954)	Yes	-	Yes. Under two Dy. Dirs. of Res. & Extension.
12.	Kerala	Yes. (Travancore-Cochin Land Dev. Act. of 1950 & Madras Act of 1949)	Yes	No	Yes. Under the Jt. Dir. of Agri. (Conservation).
13.	Jammu & Kashmir	The Land Preservation Act is in force. The State Govt. are contemplating enactment of legislation on the lines of Model Bill.	No	No	Forest Deptt: is doing the work.
14.	West Bengal	No	Yes. Under Dev. Bd.	No	-do-
15.	Delhi	No	No	No	Yes. Under SCO
16.	Tripura	No	Yes	No	Work being done by Forest Department.
17.	Himachal Pradesh	Yes. (H.P. Land Dev. Act of 1954 & Ft. Forest Act, 1954)	No	No	No
18.	Manipur	No	No	No	Work done by Agri. Department.
19.	Andaman & Nicobar.	No	No	No	No

APPENDIX NO. 2

STATEMENT SHOWING THE POSITION OF SOIL CONSERVATION STAFF UNDER THE CENTRAL SOIL CONSERVATION BOARD, MIN. OF FOOD & AGRIC.

Existing sanctioned staff:

Headquarters

1. Senior Director of Soil Conservation
2. Director of Soil Conservation (Engineering)
3. Director of Soil Conservation (Forestry)
4. Deputy Director of Soil Cons. (Agronomy)
5. Deputy Director of Soil Cons. (Engineering)

At Research, Demonstration & Training Centres.

Name of the Soil Conser- vation Research, Demonstration & Training Centre	Chief Res. Offi- cer Rs. 1000-	Soil Cons Offi- cer Rs. 600-	Asstt Soil Cons. Offi- cers Rs. 350-	Senior Scienti- fic Asstts: Rs. 160 - 330	Jr. S.A. Fieldmen Rs.	Other staff.
Dehra Dun.	-	3	2	5	4	38
Kotah	-	1	3	5	5	21
Bellary	-	1	2	5	4	26
Ootacamund	-	1	2	4	5	22
Chatra(Nepal)	-	1	2	4	3	20
Chandigarh	-	-	1	1	2	11
Agra	-	-	1	2	2	12
Vasad	-	1	3	5	6	28
Jodhpur	1	3	-	4	18	78
Pasture Dev. Scheme, Jodhpur	-	1	2	-	55	193

STAFF UNDER ALL INDIA SOIL SURVEY AND LAND USE SCHEME

(A) at the Headquarters

	No.	
1. Chief Soil Survey Officer	1	Rs. 1000-50-1400
2. Soil Survey Officer (Conservation)	1	Rs. 350 -850
3. Store Officer	1	Rs. 275-800
4. Cartographer	1	Rs. 600-1100

(B) Staff for the Regional Zones at (1) Delhi (2) Khara Sur. (3) Nagpur and (4) Bangalore

1. Soil Correlators	4	Rs. 600-1150
2. Soil Conservation Officers	3	Rs. 600-1150
3. Soil Chemists	3	Rs. 350-850

Besides the above gazetted Officers there are 50 Survey Units composed of Soil Survey Assistants and other field staff.

STAFF PROPOSED FOR HEADQUARTERS AND REGIONAL SOIL CONS. CENTRES
(INSPECTION) IN THE STATES FOR THIRD FIVE YEAR PLAN.

Chief Director
(Rs. 1600-1800)

Director of Soil Cons. (Soils) Rs. 1300-1600 (one)	Director of Soil Cons. (Agronomy) (Rs. 1300-1600) (one)	Director of Soil Cons. (Forestry) Rs. 1300-1600 (one)	Director of Soil Cons. (Engg) (Rs. 1300-1600) (one)	Director of Soil Cons. (Training) Rs. 1300-1600 (one)
--	---	---	---	---

Inspection

Dy. Directors (Inspection)... 5 Rs. 1000-1400 One for each Region.

Asstt. Directors (Inspection) 14 Rs. 600-1100 One for each State.

Research Assistants 28 Rs. 160-330 Two for Each State.

TABLE I

PROGRAMME AND POTENTIAL OF THE THIRD FIVE YEAR PLAN

Item	Plan Target	Expenditure.	Employment		Nos.	Productive Potential	
			Unskilled Man Days.	Technical		Food	Other Production
	Acres in lakhs	Rs. in lakhs	in millions			in lakh tons	
1. Soil Cons. Survey & Land Use Planning.	100.00	50.00	-	-	-	-	-
2. Research, Demons. & Training.	-	100.00	-	-	-	-	-
3. Soil Cons. in Agri. Land.	67.00	4020.00	134	34,840	5.36		
4. Soil Cons. in Desert Areas.	1.00 in the 3.00 crop lands. 4.00	400.00	4	2,080	0.08		Feed for 0.75 lakh cattle heads for the whole year at production capacity.
5. Soil Cons. in River Valley Projects	10.00	750.00	30	5,200	-		-
6. Soil Cons. in Watersheds	5.00	375.00	10	3,000	-		Increased food fodder and fuel and increased national income.
7. Soil Cons. in Hilly regions.	1.00 in the 3.00 crop land. 4.00	600.00	80	2,080		Average increase 25% for food cash crops e.g. potato.	
8. Soil Cons. in ravine lands.	2.00	200.00	6	1,000			Increased fodder, fuel and saving of cow dung for manure
9. Reclamation: (a) Saline, alkali and water logged areas. (b) Other waste lands	1.00	100.00	2.5	420		0.08	Fodder for 20,000 heads of cattle & more forest products
10. Ponds, small tanks etc. for water conservation.	-	25.00	1.25	-		0.013	For the whole year at production capacity.
TOTAL	93.00	1260.00	227.30	48,620		5.533	

* 100 lakh acres under are to be excluded.

STH A.T.

RECEIVED THE COMMISSIONER OF THE LAND OFFICE

DATE	DESCRIPTION	AMOUNT	PAID
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1903	...	...	...
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1997	...	...	...
1998	...	...	...
1999	...	...	...
2000	...	...	...

Resolution of the National Development
Council on Cooperative Policy

At its meeting on November 8 and 9, 1958, the National Development Council considered the role of the cooperative movement in intensifying agricultural production, in mobilising local manpower and other resources and, generally, in rebuilding the rural economy. The Council considered that for the development of cooperation as a peoples' movement, it was essential that cooperatives should be organised on the basis of the village community as the primary unit, and that responsibility and initiative for social and economic development at the village level should be placed fully on the village cooperative and the village panchayat. The Council recommended that in the light of this general approach, all States should take steps to review their present programmes of cooperative development and formulate fresh programmes to be implemented during the next two years. It recognised that conditions differ in different parts of the country and that it will be necessary for each State, according to its conditions, to organise the development of cooperative movement along lines set out in this Resolution during the course of the next few years.

2. In a rural cooperative, the members should have intimate knowledge of one another as well as a sense of mutual obligation and concern for the rehabilitation of the weaker sections of the community. By working together for the common objective of raising the standard of living of all sections of the population, the community develops social cohesion and unity. Where villages are too small, with the consent of the communities concerned, it will be convenient to form them into larger groups with a population of about 1000. As a rule, the cooperative and the panchayat should serve identical areas. These institutions should be given assistance and guidance, but care must be taken to see that they develop through the support of the people by undertaking constructive programmes for the benefit of the people and with their free participation. The aim should be to ensure that every family is represented in the village cooperative. It is one of the main purposes of cooperation to assist those who do not obtain credit under the ordinary banking principles. The greatest attention should, therefore, be given to ensure that the sections of the community that do not come into the cooperative society at present, are enabled to share fully in its benefits and obligations in their own right.

3. Increased agricultural production calls for a number of specific measures. These include the full use of irrigation facilities available, application of improved agricultural techniques, especially the multiplication of improved varieties of seed at the village level and the production in every village of organic and green manures, and the adoption by each village community of techniques of dry farming, contour bunding, soil conservation etc. These and other programmes should be carried out through the village cooperative in which every family is represented. Thus, the responsibility for maintaining minor irrigation works and for excavating and maintaining field channels should be placed on the village community. The cooperative should make permanent arrangements in the village for producing the seeds and organic and green manures needed, arrange for the supply of these in kind to persons who cannot pay for them in advance, recoveries being made after harvest. It should arrange for the distribution of fertilizers received for the village and for their supply to small holders on credit in the first instance. The cooperative should lay special stress on animal husbandry programmes. It should also promote programmes supplementary to agriculture, consolidation of holdings and other works of benefit to the community.

4. Village societies should be federated through Unions. They should also become members of marketing societies serving their areas of operation.

5. The National Development Council considers that the cooperative movement should be developed so as to bring within its fold all rural families before the end of the Third Five Year Plan. For the remaining period of the Second Five Year Plan, the Council suggests that State Governments should formulate intensive programmes on the basis of the following broad national targets. The conference of Development Commissioners held at Mussoorie in April 1957 recommended a minimum programme for cooperation which aimed at bringing 50 percent of agricultural families into the movement during the intensive stage of community development and 75 per cent subsequently. A programme for the revitalization of existing small cooperative societies was introduced during 1957-58. The National Development Council recommends that State Governments should make special efforts to revitalize existing agricultural cooperative societies so as to increase their membership from the present level of about 9 to 10 million to about 15 million

by the end of the Second Plan. The greater part of this increase in membership will be achieved by intensifying the work of these societies in the villages served by them. There are, however, villages which are at present not served by any cooperative society. In areas taken up under the community development programme, as a matter of first priority, cooperative societies should now be established in such villages. Each State Government should endeavour to ensure that before the completion of the first stage of the community development programme in any block, all villages have the necessary cooperative and village institutions. The programmes for the revitalization and expansion of existing societies and for setting up new societies in community development areas and elsewhere should together help to raise the membership of agricultural cooperatives to a total of about 20 million by the end of the current Plan. This will involve a doubling of the present membership.

6. The Second Five Year Plan visualizes that credit to the extent of Rs. 225 crores should be made available through cooperative agencies, Rs. 150 crores by way of short-term loan and Rs. 75 crores by way of medium and long term loans. For the new programmes now envisaged, credit requirements are likely to be larger. For providing these the National Development Council suggests that suitable arrangements should be worked out in the near future in consultation with the Reserve Bank of India. In the provision of credit, special attention must be given to facilities for the grant of crop loans. The National Development Council considers it essential that in each district and development block, the grant of credit through cooperative agencies should be closely linked with programmes for increasing agricultural production and for marketing. As arrangements are developed along these lines, steps should be taken to review the existing credit limits so as to facilitate the expansion of agricultural credit.

7. An essential objective of the cooperative movement is the inculcation of the habit of thrift and saving. In each area, within a specified period, or according to a programme worked out by the cooperatives, the effort should be to meet all the credit needs of their members. In the national savings movement cooperatives should function as primary agencies in rural areas.

8. In the course of the Second Five Year Plan, it is proposed to set up 1,900 primary marketing societies. It is expected that when this programme is carried out most

of the mandi areas in the country will be served. The National Development Council attaches much importance to the development of these cooperative marketing societies as they will assist in the stabilization of prices. For setting up these societies there should be careful surveys of the potential for increased production in each area and estimates of marketable surplus. Hitherto, even in areas in which marketing societies have been organized, their coverage has been small and restricted. By linking marketing societies with village societies and using the latter as agencies for collection and sale at assured prices at the village level, it will be possible not only to obtain larger supplies of foodgrains for meeting the needs of urban areas but also to expand greatly the credit facilities available for rural areas. The programme for cooperative processing, which is already under way, should also be enlarged, in particular, in relation to the processing of food crops.

9. To ensure the success of cooperative development programmes on the scale here visualized, training programmes should be organized for village leaders who work on village panchayats and cooperatives, for teachers in village schools, and for young men in rural areas who can serve as secretaries of village institutions. It is also necessary to expand training programmes for personnel serving in cooperative departments and to organize refresher courses for village level workers and other extension workers. Existing Cooperative Departments in the States are not adequately equipped in field personnel and at the higher levels for organizing a large programme of cooperative development. The National Development Council hopes that all States will take early steps to strengthen these Departments and to bring into the field of cooperation a larger number of competent and experience persons, both non-officials and officials. State Governments should make it a point to draw an increasing number of non-official workers for honorary service, so that cooperatives retain their dynamism.

10. The Central and State Governments have been engaged in considering measures for simplifying the present procedures for registration of cooperative societies, grant of loans and management of cooperatives. Many of the existing procedures impede the development of cooperation as a popular movement in which small

groups and communities can function freely and organize their work and activities along cooperative lines without excessive official interference and red tape. The restrictive features of the existing cooperative legislation should be removed and both the present cooperative laws and the model legislation and rules which have been under the consideration of States should be modified in accordance with the approach outlined in this Resolution. It is also essential that by making taccavi loans and other facilities available to individuals through cooperatives, conditions should be created in which every peasant and rural worker will find it to his advantage to join the village cooperative. The National Development Council trusts that State Governments will take early steps to introduce radical changes in procedures so as to facilitate the growth of the cooperative movement.

11. The National Development Council believes that through the development of cooperatives based on the values of freedom and community responsibility and organized as a national movement the creative energies of the people will be released for the tasks of national reconstruction.

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Guide to Agriculture of Saitama

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 - (a) Saitama Pref. Domestic Animals Examination Station.
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(c) Yorii Artificial Impregnation Station.

Iruma " " "

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(a) Farming with horses and oxen, and cultivated area.

(b) Rice planting midway plowing and weeding.

(c) No. of cultivators used for midway plowing.

(d) No. of farm-houses raising livestock and
No. of animals and birds.

O. Sericulture industry.

A. No. of cocoon raisers and amount of cocoon crops.

B. Sericulture Experimental organs.

(a) Saitama Pref. Sericulture Experimental Station.

Saitama Pref. Sericultural Experimental Br. Station.

(b) Saitama Pref. Cocoon Test Station.

C. Sericulture Technique guidance Station

1. Forestry Industry.

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A. Rural District Industries.

B. Subsidiary business.

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B. Agricultural Financing.

For information.

(1) Sayama Tea.

(2) Potato cracknel.

(3) Plants of Angyo:

Guide to Agriculture of Saitama

1. History of Prefecture name "Saitama"

As to the pronunciation of Saitama, in old times it was pronounced Sakitama. If we interpret the words, "Sakitama" means a god Saitama who protects human beings and their happiness.

2. Advance of the Prefecture.

A. Pre historical times.

This prefecture is situated in the northern part of Musashi Province which is composed of Saitama Prefecture, the whole of Tokyo-to and a part of Kanagawa Prefecture. It has been inhabited by human beings for two or three thousand years. Shells and traces of inhabited sites are found in many places. In those days the water of the present Tokyo Bay was washing the paddy area which was alluvial soil situated in South-eastern part of the Province. The province of Musashi was an area favored with natural resources.

B. Ancient times.

In the reign of the Emperor Junnin and in the era of Tensho there were mass immigration of 2,000 Kama people to the Western part of Iruma-gun, 300 Shiragi people to the Southern part of Kitaadachi-gun. Besides these, judging from the places named after the names of naturalized people such as Kudara, Hombata-mura, Osato-gun and Imakisansha, Kodama-gun, it is clear that Continental civilization was gradually introduced into this prefecture. The Bay of Tokyo began to move backward and communication became convenient and with the development of the southern part, the culture of the northern part began to move toward south and it has a chance to develop together with industries.

C. Medieval age.

It was in this period that this prefecture produced many men of talent. Political power in the hands of the military caste lasted for a long time. There were incessantly contentions of economical rights, contest

for central political powers and oppositions of Governor generals of Kanto district. There were thirty battles large and small and most of the people had to live in fear and hunger. Almost all magnificent shrines and temples were reduced to ashes. This is called the age of civil war famous in history. The Castles of Kawagoe, Iwatsuki, Okabe and Oshi in this prefecture were built in these days.

D. Modern times.

As to the administration of this prefecture in those days, the territories of feudal lords were possessed by four small clans of Kawagoe, Iwatsuki, Okabe and Oshi and the rest was in possession of the persons under direct control of the Shogunate, Hatamoto or owned by shrines and temples. There were 78 feudal lords in the prefecture, that is to say, every present village has three different lords. This had a strong influence on the character of the prefectural people and deprived the people of cooperative spirit. Be that as it may, it was the policy of the Tokugawa Regime to have this prefecture directly attached to Yedo as an area of supplying materials. With this object, the Government made efforts for the water control of rivers such as the Tone, Arakawa, Yedo, Shingashi and Iruma. It set to the development of waste land and present Saitama owes greatly to the policy of the Government.

Prefectural special products such as Kawagoe potato, Sayama tea, Chichibu silk, Gyoda socks (tabi) Kawaguchi castings can be said the results of this policy. Thus, the prefecture became an important treasure house that furnished Yedo with Necessary materials.

E. Present day.

The governing power was restored to the Emperor in the 3rd year of Keio and the name of a chronological era was amended as the 1st year of Meiji on the 8th day of September of the same year. The military government that lasted 680 years from Kamakura Shogunate was dissolved, and at the same time, those complicated areas were consolidated and later on some administrative areas were amalgamated or separated but in the 9th year Saitama Prefecture, Kumagaya Prefecture and a part of Chiba Prefecture were combined and present Saitama Prefecture with

8 cities and 9 counties (gun) has been formed.

3. Outline of Prefectural condition.

The prefecture is situated in the western part of Kanto plains. Except for the Western mountainous district overing one-third of the total area, the middle and eastern parts are vast plaing. The nature of the soil of the former is composed of crystal-line rock and Chichibu paleozoic strata and that of the latter is composed of light slime of alluvium of volcanic ashes and low-land of alluvium of cleyey soil, and the paddy and upland fields are nearly half and half. The Tone and the Arakawa which are the main rivers and their tributaries large and small run through the prefecture. They afford good conditions to the promotion of agricultural industries, especially a great quantity of rice, wheat, barley, sweet potato and cocoons are produced. In parallel with agricultural products, Chichibu meisen (silk) and other textiles are produced in the west of the prefecture and Gyoda tabi (socks) and sewn goods industries in the north, castings and farm implements manufacture in the south and wooden ware manufacture all over the prefecture are flourishing. Next to Keihin and Hanshin industrial areas, Saitama is building up a good footing in all Japan.

The total a rea of the prefecture is 3804 kilometers, the population is over 2,200,000, and number of families is 400,000. Being situated near Tokyo, roads of Nikko-kaido, Nakasen-do and Shinkoku-do pass through the prefecture from east to west. It has good facilities of communication; for Government Rail Roads Takasaki line and Tohoku line and Company owned Private Rail Roads of Tobu, Seibu and Toji which have staring points at Ueno, Asakusa and Ikebukuro are laid in the prefecture. Saitama has been helping the work of the kitchen of Tokyo-to for a long time. Agricultural products are directly supplied to Tokyo. In other industries and manufacture, those kinds of work that supply finished goods manufactured from raw materials are comparatively achieving good results. The prefecture has a tendency of supplying residential grounds to Tokyo-to, and especially, many famous men of the Central such as peiple of financial circle and men of outlure are residing in and about Urawa City, Prefectural metropolis

that the southern part of the prefecture is called a satellite city of Tokyo-to.

4. Position of Prefecture.

It is situated:

North end:	Kami-mura, Kodama-gun	N. Latitude	36 19 m.
South end:	Katayama-mura, Kitaadachi-gun	N. Latitude	35 29 m.
East end:	Waseda-mura, Kitakatsushika-gun	E. Longitude	139 54 m.
West end:	Otaki-mura, Chichibu-gun	E. Longitude	138 43 m.

5. Meteorological condition.

A year is divided into four seasons.

Temperature		Amount of rain
Spring	12.1 C	91.8 mm.
Summer	26.0 C	182.0 "
Autumn	16.5 C	165.9 "
Winter	2.1 C	29.3 "
Amount of rain during a year		1,315.7 "
Amount of snow "		
Fall of frost		From October to May next year.
Average Highest temperature		19.1
Average lowest "		8.9

6. Position of Prefecture according to census.

A. Area of Land, No. of cities, towns and villages, population and others.

(a) Area of land.

	Total	Paddy	Upland	Residential land	Forest	Grass land	Salt field pond, marsh, etc.
	cho	cho	cho	cho	cho	cho	cho
Saitama	243,032	69,950	93,488	18,853	58,992	4,749	823
All Japan	14,921,135	3,012,732	2,657,376	513,783	7,135,128	1,597,897	76,060
Order	31st	21th	4th	7th	40th	29th	25th

(b) No. of cities, towns and villages classified by population.

	Total No.	1-99	1000-1999	2000-4999	5000-9999	10000-19999	20000-29999	30000-39999	40000-49999	Over 500000
Saitama	132 Towns & villages	1	10	206	75	18	3	3	1	5
All Japan	" "	108	960	5,601	2,618	724	123	74	51	155
Order		17th	28th	8th	13th	12th	12th	8th	14th	8th

(c) No. of population and families.

No. of persons living in Saitama: 2,150,000 persons.
9th in all Japan
(2,200,000 at present).

Density of population: 564 persons per 1 Square
Kilometer. 6th in all Japan.

No. of births per year: 63,000 persons.

No. of deaths per year: 26,000 persons.

Rate of increase: 36,930 persons.

No. of births per day: 173 persons.

No. of deaths per day: 72 persons.

No. of families: 400,000 13th in all Japan.

Average No. of members per family:

5.3 persons which is 0.4 persons
more when compared with 4.9
person in all Japan.

B. Fundamental factor of Farm management.

(a) No. of farm families: 169,000

Population: 1,140,000

Ranks high in all Japan (53% of the whole population)

Average No. of members per family: 6.6 persons.

(Male: 3.0 Female: 3.6)

(b) Area of farmland under management: Approx. 150,000
cho 6th in all
Japan 2.7%.

Details:

Paddy: 70,000 cho. Upland field: 80,000 cho.

Upland products are noteworthy in all Japan.

Area of farm land under management per family:

8 tan 9 se. % of paddy field: 44.8%.

Upland field are utilized as general fields. As
the prefecture is a cocoon raising area, 10% of
the land is mulberry fields.

Running area under cultivation and utilization
compared with those of all Japan.

	<u>Running area</u>	<u>Utilization</u>
Saitama	1 cho 8 tan 6 se	169.1 Higher than the average in all Japan.
All Japan	1 " 4 " 9 "	146.1

% of one-crop a year paddy against the whole area under management is 28.2% in this prefecture and 31.2% in all Japan. Although there is a considerable area of mulberry field, the land is well utilized, because being situated near Tokyo, greens are produced in plenty.

7. Agricultural extension work.

39 Agricultural extension stations are established in the prefecture, 285 farm-advisors and 19 Home advisors are stationed there. They are propelling their works on a new system.

A. Measures for Agricultural technique improvement and extension.

Individual guidance and mass guidance are being given by exhibition of actual results through 291 Agricultural research organs with 9,984 members.

Besides, guidance is given to the Buraku which is established for the exhibition of actual results.

B. Fostering and guidance of young farmers (4H clubs).

Young farmers are receiving guidance and teaching from 258 4H clubs and 6,073 members.

C. Improvement of livelihood (clothes, food, house, and life of women)

Farm-houses and livelihood are being improved by 611 Livelihood Improvement clubs and 5,380 members.

D. Agricultural Examination and Research Organs.

Saitama Pref. Agricultural Experimental Station (Head Station) is established at Ageo, Kitaadachi-gun and it has the following organizations to conduct research works and synthetic management.

<u>Department</u>	<u>Name</u>	<u>Location</u>
Crops	Tamai Branch	Kubojima, Kumagaya City
Horticulture	Head Station	Ageo-machi, Kitaadachi-gun
Pref. Agric. Experimental Station	"	Koshigaya Br. Koshigaya-machi, Minamisaitama- gun.
Chemical	Head Station	Ageo-machi, Kitaadachi-gun.
Disease & Insects	Head Station	"
Tea Manu- facture	Tea Br.	Toyooka-machi, Iruma-gun.
General Affairs Sect.	Head Station	Ageo-machi, Kitaadachi-gun.

Besides these organs, there are following seed-farm organs.

<u>Name</u>	<u>Location</u>
Tamai Seed-farm	Kubojima, Kumagaya
Irumagawa Seed-farm	Irumagawa-machi, Iruma-gun.
Chichibu Seed-farm	Hitsujiyama, Chichibu city.

E. Agricultural Education Facilities.

(a) Saitama Prefectural Agricultural Promotion and Training School.

Sugaya-mura, Hiki-gun lies in the center of Saitama Prefecture approximately 10 k.m. north west of Tokyo. This beautiful village is the type one of Japan surrounded with hills, rivers, paddies and upland fields. There are many households that are tilling their hereditary farmland for hundreds of years. With these beautiful environments, Agricultural Training School was established by the Prefecture where agricultural education is given to graduates of high schools and a special training to those who are desiring immigration abroad. This is the only agricultural education facility in Japan.

The great object of training farm youths is to give them up-to-date knowledge of science and agricultural technique, to improve the livelihood of farmers and to give them high education that enables them to have a broad view of the world.

Second and third sons of farmers who are desiring immigration abroad are given the knowledge and training about foreign affairs, the knowledge of cultivation spirit and actual researches in foreign countries, necessary agricultural technique and languages of foreign countries. They are educated to gain respects of people and to be loved by people they come in contact with wherever they may live as immigrants.

Fixed number to be admitted to the institution.

Regular course: 50 Research course some.

(b) Prefectural Agricultural School

At Ageo-machi, Kitaadachi-gun.

The object is to train farm advisors. After graduating from High Schools, the students receive lessons of academic subjects, training and practice necessary to

Agricultural Technicians for two years. They can have qualifications for Farm Advisors Examination. Fixed No. 50 persons.

- (c) Saitama Prefectural Farm Management Training Institute Located Tsurugashima-mura, Iruma-gun.

Farm youth (especially sons and young women of Agricultural Communities) who graduated from junior high schools can receive lessons of agricultural science and actual training for one year (two year including research course)

The institute aims at cultivation of such young man and women who want to promote the establishment of modern village especially want to be 4H club leaders who will cooperate with Farm Extension Agents.

Fixed number to be admitted to the institute
 Regular course (Male 50 Research course 1
 (Female 30

8. Planting and production of staple food and order.

A. Upland and Paddy rice.

	<u>Area under cultivation</u>	<u>Actual amount of harvest</u>	<u>Amount of harvest per tan</u>
	cho	koku	koku
All Japan	3,039,570	54,923,800	1,990
Saitama	85,170	1,183,500	1,892
Order	13th	21th	20th

(Estimated planting area of upland rice is big, so the actual amount of harvest is small.)

B. Wheat and barley

	Planting area	<u>Barley</u> <u>Actual</u>			Planting area	<u>Wheat</u> <u>Actual</u>		
		amount of harvest	per tan	Harvest		amount of harvest	per tan	Harvest
All	cho	cho	cho	cho	cho	cho	cho	cho
Japan	423,670	9,726,100	2,304	741,260	10,885,200	1,472		
Saitama	40,980	1,419,500	3,468	39,090	807,100	2,068		
Order	2th	1th	1th	3th	ath	1th		

	Planting area	<u>Rye</u> <u>Actual</u>	
		amount of harvest	Harvest per tan
All			
Japan	563,410	8,007,200	1,246
Saitama	2,640	62,400	2,363
Order	32th	26th	1th

C. Potatoes

	Planting area	<u>Sweet potato</u>			Planting area	<u>Irish potato</u>		
		Amount of harvest	per tan	Harvest		Amount of harvest	per tan	Harvest
All	1,000 cho	1,000 kan	1,000 kan	1,000 cho	1,000 kan	1,000 kan		
Japan	401,350	1,677,384	419	1,940,137	7,506,600	367		
Saitama	18,250	78,067	439	64,900	19,544	300		
Order	7th	8th	9th	2th	32th	42th		

D. Other crops

	<u>Bean</u>		<u>Indian bean</u>		<u>Pea</u>	
	<u>Planting area</u>	<u>Actual Amount of harvest</u>	<u>Planting area</u>	<u>Actual Amount of harvest</u>	<u>Planting area</u>	<u>Actual Amount of harvest</u>
	cho	koku	cho	koku		
All						
Japan	299,496.4	2,503,121	63,356.8	414,331	10,840	91,000
Saitama	10,131.9	69,333	2,058.3	11,387	30	220
Order	8th	9th	10th	10th	23rd	23rd

	<u>French bean</u>		<u>Broad bean</u>		<u>Buck-wheat</u>	
	<u>Planting area</u>	<u>Actual Amount of harvest</u>	<u>Planting area</u>	<u>Actual Amount of harvest</u>	<u>Planting area</u>	<u>Actual Amount of harvest</u>
All						
Japan	29,932.6	296,397	23,860	213,400	59,166.3	392,260
Saitama	32.3	227	120	1,700	637.6	4,595
Order	27th	28th	38th	36th	20th	18th

	<u>Millet</u>		<u>Indian corn</u>	
	<u>Planting area</u>	<u>Actual Amount of harvest</u>	<u>Planting area</u>	<u>Actual Amount of harvest</u>
	cho	koku	cho	koku
All				
Japan	61,627.8	639,102	39,451.3	439,132
Saitama	1,006.3	6,944	772.9	7,465
Order	14th	16th	11th	13th

E. Planting area and actual harvest of greens.

	<u>Egg-apple</u>		<u>Cucumber</u>		<u>Pumpkin</u>	
	<u>Planting area</u>	<u>Actual Amount of harvest</u>	<u>Planting area</u>	<u>Actual Amount of harvest</u>	<u>Planting area</u>	<u>Actual Amount of harvest</u>
All	cho	kan	cho	kan	cho	kan
Japan	26,731.8	100,958,330	21,362	83,218,300	37,662	140,657,100
Saitama	1,324.3	5,412,329	1,492	6,140,100	1,008	3,693,500
Order	3rd	2nd	1st	2nd	9th	9th

	<u>Radish</u>		<u>Carrot</u>		<u>Brudock(gobo)</u>	
	<u>Planting area</u>	<u>Actual Amount of harvest</u>	<u>Planting area</u>	<u>Actual Amount of harvest</u>	<u>Planting area</u>	<u>Actual Amount of harvest</u>
All	cho	kan	cho	kan	cho	kan
Japan	92,737.4	576,945,255	17,504.7	59,080,863	16,514.4	55,230,548
Saitama	2,806.2	15,343,208	1,395.9	4,613,323	1,076.2	3,483,937
Order	8th	11th	2nd	2nd	2nd	2nd

	<u>Tato</u>		<u>Stoneleek</u>	
	<u>Planting area</u>	<u>Actual Amount of harvest</u>	<u>Planting area</u>	<u>Actual Amount of harvest</u>
All	cho	kan	cho	kan
Japan	34,882.8	115,880,705	20,526.1	77,124,335
Saitama	1,893.0	6,076,181	1,857.1	9,384,763
Order	3rd	4th	1st	1st

Planting area and harvest of other greens rank middle in all Japan.

F. Fruit-trees and harvest.

	<u>Orange</u> kan	<u>Apple</u> kan	<u>Grapes</u> kan	<u>Japanese pear</u> kan	<u>Chest- nut</u> kan
All					
Japan	92,694,215	116,847,713	9,602,335	19,312,190	6,959,447
Saitama	16,064	1,247	35,749	504,796	218,285
Order	38th	36th	31st	15th	9th

	<u>Persimmon</u>	<u>Peach</u>	<u>Plum</u>
All			
Japan	51,818,719	8,437,700	10,565,800
Saitama	1,179,056	79,400	459,800
Order	16th	30th	6th

G. Planting area and harvest of crops for manufacturing use.

	<u>Rape-seed</u>	<u>Sesame</u>	<u>Cotton</u>
	Actual Planting area	Actual Amount of harvest	Actual Amount of harvest
	cho	koku	cho
All			
Japan	119,360	993,400	8,232
Saitama	4,350	36,100	534
Order	7th	8th	2nd

	<u>Tobacco</u>	<u>Paper mulberry</u>	<u>Devil's tongue</u>
	Actual Planting area	Actual Amount of harvest	Actual Amount of harvest
	cho	koku	cho
All			
Japan	52,890	24,610,600	75
Saitama	91	40,000	98.5
Order	41st	42nd	(Black bark)

	Tamo (Kind of holly hock)		Tea	
	<u>Planting area</u> cho	<u>Actual Amount of harvest</u> kan	<u>Planting area</u> cho	<u>Actual Amount of harvest</u>
Saitama	325	416,250	1,700	Dried 52,856 kan Steamed 400,000 kan

9. Livestock Infustry.

A. Saitama Pref. Livestock Breeding Station.

At Sugahiro, Komatsu-mura, Osato-gun.

It was established in 1948 with the object of raising livestock and popularizing the technique and for supplying good breeding animals and improvement of kinds. The best kinds of breeding animals imported.

Cattle: Breeding ox for milk cow. It won an honor prize at the Holstein Competitive Exhibition. Born at Town & Village Farm in Hokkaido. Great Aaltiji King 7th.

Swine: Born in England.
Native of Yorkshire, Zepher Commander.

Native of Berkshire, Lenton Keystone 5th.

Hens: White Leghorn for eggs. 60 eggs.) Imported from Barred Plymouth Rocks. 34 eggs.) America

Animals and fowls raised by farm-houses at present.

Milk Cow (Holstein) 32 Head (Bull 3 Cow 15 Bearing cows 14)

Draft Cow (Improved Japanese cattle)
3 Head (Bull 2 Farm ox 1)

Horse (Anglo-Norman & Anglo-Arab)
4 Head (Stallion 2 Farm horse 2)

Swine (Yorkshire) 24 Head (Boar 4 Brood Sow 20)
(Berkshire) 12 Head (Boar 2 Brood Sow 10)

Sheep (Corridale) 44 Head (Ram 4 Ewe 40)

Goat (Saanen) 8 Head (Male Got 3 Female Goat 5)

Hen (White Leghorn) 300
(Nagoya) 40
(Phode island red) 20
(Barred Plymouth Rocks) 30

Rabbits (Angola) 20
(New Zealand White & American White) 90

B. Saitama Pref. Domestic Fowl Breeding Extension and Guidance Station.

At Omiya City.

Fowls (Cheifly hens and ducks). Improvement of kind, Supply of breeding fowls, popularization of technique are main objects. They are making efforts to meet the demand of fowl-breeders, to give guidance to fowl-breeders in general, distinguish between male and female and to popularize knowledge and technique of chicken-raising.

C. Saitama Pref. Domestic Animals, Health Examination ~~Station~~, Station, Health and Saitama Center and Artificial Impregnation Station.

Domestic animals sanitation organs were perfected in 1951. With these organs as center, mass domestic animals sanitary technicians and veterinary practitioners were given training to exert for the sanitation of domestic animals with combined efforts of both government and people.

Domestic animals sanitation facilities are listed below.

(a) Saitama Pref. Domestic Animals Examination Station.

Location: Urawa city.

(b) Saitama Pref. Central Domestic animals Health and Sanitation

Location: Urawa city.

Okegawa Domestic Animals Health Center.

Location: Okegawa-machi,
Kitaadachi-gun.

Kawagoe " " " "

Location: Shinjuku-machi,
Kawagoe city.

Matsuyama " " " "

Location: Matsuyama-machi,
Hiki-gun.

Kodama " " " "

Location: Kodama-machi,
Kodama-gun.

Chichibu " " " "

Location: Ohata, Chichibu City.

Kumagaya " " " "

Location: Kumagaya City.

Hanyu " " " "

Location: Hanyu-machi,
Kitasaitama-gun.

Sugito " " " "

Location: Sugito-machi,
Kitakatsushika-gun.

(c) Yorii Artificial Impregnation Station.

Location: Yorii-machi, Osato-gun.

Iruma " " " "

Location: Iruma-mura, Iruma-gun.

D. Utilization of animal power.

Agriculture of this prefecture is showing development by the use of animal power and machines and this is a great agricultural reform which increases productive power. Condition of utilization of horses and oxen is shown below.

(a) Farming with horses and oxen, and cultivated area.

	<u>Cultivated area</u>	<u>Area cultivated by horse & ox.</u>	<u>%</u>	<u>Cultivated area</u>	<u>Area cultivated by horse & ox.</u>	
	cho	cho		cho	cho	
Saitama	65,300	56,000	85%	64,500	35,000	54%

(b) Rice planting midway plowing and weeding.

<u>No. of machines used for rice planting interim plowing.</u>	<u>Area of cultivated land</u>
218	223 cho

(c) No. of cultivator s used for midway plowing: 8,350

(d) No. of farm-housed raising livestocks and
No. of animals and birds.

	<u>Cattle</u>			
	<u>For milking use</u>		<u>For Farm use</u>	
	<u>No. of farm houses raising Cattle</u>	<u>No. of Cattle</u>	<u>No. of farm houses raising Cattle.</u>	<u>No. of Cattle</u>
All				
Japan	133,024	198,128	1,985,748	2,251,955
Saitama	5,663	6,939	39,241	3,993
Order	5th	4th	8th	10th

	<u>Horse</u>		<u>Sheep</u>	
	<u>No. of farm houses raising Horses</u>	<u>No. of Horses</u>	<u>No. of farm houses raising Sheep</u>	<u>No. of Sheep</u>
All				
Japan	905,324	1,071,131	253,109	358,530
Saitama	17,156	17,237	4,307	5,544
Order	17th	17th	12th	12th

	<u>Goat</u>		<u>Swine</u>	
	<u>No. of farm houses raising Goats</u>	<u>No. of Goats</u>	<u>No. of farm houses raising Swine</u>	<u>No. of Swine</u>
All				
Japan	352,554	413,284	458,647	607,632
Saitama	12,217	13,084	22,298	27,234
Order	9th	12th	5th	5th

	<u>No. of farm houses raising Rabbits</u>	<u>Rabbit</u> <u>No. of Rabbits</u> <u>Angora</u> <u>Others</u>	<u>No. of farm houses rais- ing Hens</u>	<u>No. of Hens</u>
All				
Japan	951,247	312,501 1,451,556	3,754,242	16,545,21
Saitama	21,600	5,541 34,641	102,073	455,12
Order	19th	14th 19th	13th	115h

Livestock Condition of Saitama Prefecture.

		Saitama					
All Japan		No. of farm-houses raising Domestic Animals					
Under	Families	No. of Families	Cow	Horse	Swine	Goat	Sheep Chicken
3 tan	1,254,985	21,921 12.9%	278 1.2%	107 0.4%	956 4.3%	2,000 9.1%	350 1.5%
3 - 5	975,112	22,092 13.0%	1,084 4.9%	178 0.8%	2,130 9.6%	2,214 10.0%	606 2.7%
5 -10	1,907,375	52,191 30.9%	11,032 2.1%	2,110 4.0%	7,436 14.2%	3,839 7.3%	1,529 2.9%
10-15	1,048,628	42,221 25.0%	17,522 41.5%	6,071 14.3%	6,235 14.7%	2,397 5.6%	1,039 2.2%
15-20	468,668	21,760 12.8%	10,321 47.4%	5,731 26.3%	3,592 16.5%	1,150 5.2%	479 2.2%
20-30	298,746	8,147 4.8%	3,837 47.0%	2,873 35.2%	1,737 21.3%	562 6.8%	291 3.5%
30-50	120,851	350 0.2%	153 43.7%	86 24.5%	158 45.0%	42 12.0%	16 4.5%
50-100	61,932	7 0.004%	4 51.7%	-- --	4 57.1%	-- --	1 1.4%
Total	16,168,017	168,691	44,231 26.2%	17,156 10.1%	22,248 13.18%	12,204 7.2%	4,306 2.5%
							101,938 60.4%

10. Sericulture Industry.

Amount of cocoon production is next to those of Nagano and Gumma. It ranks third in all Japan. Income of farmers by cocoon raising is approximately 5,040,000,000 yen, accordingly, it has a great influence on the economy of agricultural districts,

A. No. of cocoon raisers and amount of cocoon crops.

	<u>No. of cocoon raisers</u>	<u>Amount of cocoon eggs</u> gr.	<u>Amount of cocoon crop</u> kan	<u>Cocoon crop per 1 gr. of eggs hatched.</u> kan
All				
Japan	834,628	29,478,580	21,444,029	0.727
Saitama	66,953	2,812,537	2,148,915	0.764
Order	3rd	3rd	3rd	1st

B. Sericulture Experimental organs.

(a) Saitama Pref. Sericulture Experimental Station.
Kumagaya City, Osato-gun.

Saitama Pref. Sericulture Experimental Br. Station.
Kawagoe City, Iruma-gun.

(b) Saitama Pref. Cocoon Test Station.
Kumagaya City.

C. Sericulture Technique guidance Station.

With the object of propelling extension of sericulture technique, Sericulture Technique Guidance Stations are established one for Prefecture and one for each of gun, 11 in all. Joint Silk-raising Station is established and guidance is given by means of technique exhibitions about silk-raising and cultivation of mulberry trees. 260 Sericulture Technique Guidance are established in cities, towns and villages, and they are giving benefit to silk-raisers.

11. Forestry Industry.

Except for State owned forest, the total area of the forest land of this prefecture is 130,000 cho. We have a proverb, "The value of a mountain does not lie in its height but its value lies in the trees it has." But owing to extreme denudation, it is considerably laid waste against Divine Providence and there are many forests that have lost their natural shape. Accordingly this becomes the cause of disaster and it is casting a gloom over Prefectural industries. Measures are being taken for technical research of restoration, supply and demand of lumber, preservation of forest land, etc.

Area of forest land by kind.

<u>Forest land for producing lumber</u>				
	<u>Total</u>	<u>Total</u>	<u>Needle- leaf trees</u>	<u>Broad- leaf trees</u>
All	cho			
Japan	20,829,677	18,346,203	5,035,045	7,373,125
Saitama	90,644	75,357	22,934	33,412
Order	44th	43rd	44th	38th

<u>Forest land for producing lumber</u>			
	<u>Needle & board leaf trees</u>	<u>Bamboo forest</u>	<u>Area de- Forested and damaged</u>
All			
Japan	4,750,125	109,630	1,077,491
Saitama	16,098	567	2,346
Order	41st	40th	43rd

	<u>Forest land not for lumber production</u>	<u>Waste land</u>
All Japan	1,213,439	1,270,035
Saitama	11,532	3,755
Order	20th	41st

12. Fisheries.

When the fishery resources are investigated, as the prefecture is without seas, we can expect no marine products. However, we have big rivers such as Arakawa, Tonegawa, Yedogawa and Ogagawa, many river beds of these rivers now out of use and many canals run all directions. There are a great number of big ponds and marshes in high land districts. There are many paddies and places dug which can be utilized for fish production the Total area of these is about 73,000 cho. 56 kinds of fish are reared as fishery resources and technical researches and experiment are being conducted for encouragement.

A. Prefectural Fishery Experimental Station.

Located at Mitsumata-mura, Kitasaitama-gun.

Guidance and encouragement are given for positive utilization and improvement.

B. Fish farming in paddies.

For good

	<u>No. of fish breeding families</u>	<u>No. of farm houses</u>	<u>No. of workers</u>	<u>No. of tsubo</u>	<u>Amount of catch</u>
				(Unit:10000)	(Unit:1000)
All Japan	144,708	130,476	154,376	26,723.7	332.9 kan
Saitama	628	628	758	89.7	2.6
Order	28th	25th	27th	21st	23rd

13. Rural District Industries and Subsidiary Business.

A. Rural District Industries.

90% of factory management and form of the rural district industries is organized by Agricultural cooperative Associations.

(a) Food-stuff factory.

Grain processing	Starch M&G. & processing	Soybean paste & Soybean sauce	Canned & Tea bottled M&G food	Pickles	Other
114	24	6	2	1	5
					1
(b) Lumbering and Wood & bamboo works.					1
(c) Oils and fats manufacture.					3
(d) Others.					2
Total			159 factories.		

B. Subsidiary business

Products made of straw are as follows.

<u>Rope</u> kan	<u>Matting</u> sheets	<u>Straw-bag</u> sheets
467,137	2,115,612	75,577

14. Agricultural Cooperative Association.

In accordance with the enactment of the Law concerning Agricultural Cooperative Association established 15 Aug. 1948, Synthetic Agricultural Cooperative Associations were established in all cities, towns and villages in the prefecture and Cooperative Association by industries were also established.

A. Condition of establishment of Agricultural Cooperative Associations in the Prefecture.

<u>Synthetic Agricultural Cooperative Association</u>	<u>Sericul- ture Agric. Coop.</u>	<u>Reclama- tion Agric. Coop.</u>	<u>Livestock Agric. Coop.</u>	<u>Rural district Industry Agric. Coop.</u>	<u>Others.</u>
389	1,071	37	48	16	27

B. Agricultural Financing.

<u>Deposit of Agric. Cooperatives</u>		<u>Barrowing by farmers classified by Terms.</u>	
<u>No. of farmers</u>	<u>Amount</u>	<u>No. of farmers.</u>	<u>Amount</u>
	yen		yen
All			
Japan	173,403 3,091,757,881	84,010 2,060,868,745	
Saitama	5,987 116,728,763	1,390 29,890,800	
Order	4th 4th	28th 30th	

Barrowing by farmers classified by Terms.

<u>Agricultural paper</u>		<u>Term over 1 yr.</u>	
<u>No. of farmers.</u>	<u>Amount</u>	<u>No. of farmers.</u>	<u>Amount</u>
	yen		yen
All			
Japan	30,351 392,462,004	34,672 907,832,749	
Saitama	180 2,470,900	650 16,996,750	
Order	31st 24th	26th 27th	

For Information.

(1) Sayama Tea.

About 700 years ago Myoe-shonin, a priest of Toganoo was sent a number of tea-plants from Eisai. He planted the trees for trial in Provinces of Yamashiro, Musashi and other places. It is the established saying that our Sayama Tea has its origin in this. After some changes, the present tea is produced. The amount of production does not come up to that of Uji or Shizuoka, but it is said Sayama Tea has better fragrance than the tea of Uji or Shizuoka. Sayama Tea of Musashi is well known in the tea industrial world of Japan.

(2) Potato cracknel.

It is said that in old times Shogun Tokugawa gave the name of Kawagoe potato in praise of the sweet potatoes produced in Kawagoe. Potato-cracknel is a kind of sweets made from this Kawagoe potato. There are many kinds such as Sweet potato cracknel (Hatsukari-yaki), Sweet potato Arare (Hatsukari Arare), Sweet potato Rakugan (Hatsukari Rakugan), etc. They are known with the name of local color. They have a particular sweet fragrance. Hatsukari was the name of Kawagoe Castle which was called "Hatsukarijo". These sweets are named after this castle.

(3) Plants of Angyo.

The nature of the soil in the neighborhood of Angyo is the mixture of volcanic ashes and humus and it is best fitted for the cultivation of plants. It ranks first in all Japan in the production of garden plants, potted plants, planting-trees and various kinds of seedlings.

The condition of cultivation prior to the War was as follows

Area of cultivation: 1,200 cho.

No. of cultivators: 2,000 families.

There is Prefectural Sample Garden of plants and seedlings and the people are making efforts for improvement.

